

# AVIATION WEEK

APR. 27, 1953

50 CENTS

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**TIME WAS** when aircraft had no brakes. In those days, planes were light and slow enough to stop themselves before they "ran out of runway."

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# Aviation Week

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### Domestic

Western Air Lines DC-6B crashed in San Francisco Bay during an approach to Oakland, Calif., last week, minutes after 44 passengers were evacuated at nearby San Francisco airport. Eight of the 10 persons still aboard were killed.

Continental Airlines set a new air safety record this month, completing 23 years of carrier operations without a single fatality or serious injury to a passenger or crew member.

Bozell Airways fired 500 members of Air Carrier Mechanics Assn. (AFL) at Dallas last week after the workers refused to call off a walkout touched off by the demand of an operative and re-employment of a maintenance crew chief.

Twenty witnesses representing scheduled carrier airlines, Air Force and the Puerto Rican government, are scheduled to testify on the role of aerial surveillance in an transportation during Senate Sen. Russell Conrad's testimony hearings Apr. 23-May 1.

Scheduled airlines turned testicles about one hour this week (Apr. 25) in reply on Daylight Savings Time, making arrival and departure schedules conform for the first time to local clocks.

Lt. Gen. Edward R. Quanda (AF Ret.) is expected to be elected a director of Lockheed Aircraft Corp. at the annual meeting of stockholders May 5 at Burbank, Calif.

Maj. Gen. J. E. Phillips (USAF Ret.), former commanding officer of Cape Cod, Mass., AF research center, has been named to head up Aircraft Industries Assn.'s new general market committee which will draw up a manufacturer's cooperative program in research, engineering, design, development, construction and testing.

Paul D. Freytag, 25, president of American Aircraft Corp., Teterboro, N. J., was killed Apr. 17 when the Sperry Mark 24 he piloted to fly, as the 1931 International Air Race west December crashed near Hillburn, N. Y.

New low-frequency ADF (radioactive direction finder) has been developed by GenCorp. It is increasing static problems of LF equipment and line-of-sight limitations of VHF, source trials by major overseas airlines are scheduled to be held.

Boeing Motors, Inc., Redmond, Wash., is the new name of the



SPERRY ROBOT CONTROLS in case of Lockheed DF-16 piloted jet plane and its control system systems into an airfield closed by ground "hazy pilots." The DF-16 can be taken off, flown and

landed accurately by radio signals and radio beam ground control stations or communication "boom" Lockheed DF-16 jet two-seater. Note antenna pointing above pilot's seat.

General plant of Texas Aircraft Corp. is the new name of Lancaster Airplane Corp., merged recently into the parent company.

Texas Gyrobus, World War II chief of aircraft bench and rocket research at the California Institute of Technology, has been named special assistant for Air Force research and development.

Stratoliner has flown more than 85,797,931 mi since the first test went into operation last year ago Boeing Airplane Co. reports.

QF-107 aircraft manufacturers acquired 35 lightnings valued at \$236,000 during March, increasing the number of foreign shipments this year to 90 units.

### Financial

Douglas Aircraft Co.'s net earnings increased sharply during the first quarter of fiscal 1952 to \$6,308,757, and sales climbed to \$21,654,268—more than double the Santa Monica, Calif., firm's net earnings of \$1,997,096 and \$31,271,845 in sales for the same period of fiscal 1951. Backlog at the quarter's end was \$70,830,000, 55% in fulfilled delivery orders and 17% unannounced.

Boeing Motors, Inc., Redmond,

N. J., reports record sales totaling \$4,942,800 in 1952, breaking the previous high of \$4,637,700 in 1951. Net profits after taxes declined to \$116,000 from the preceding year's figure of \$145,900.

Grumman Aircraft Co., Wichita, ended its first half of the current fiscal year with sales of more than \$73 million, an increase of \$2.5 million over the first six months of fiscal 1952. The Wichita manufacturer has ordered a 25-cent stock dividend.

Hawkins Airlines reports net profit of \$129,071 for 1952, compared with \$19,194 in the preceding year.

### International

C-46 operated by Agate-Aer Co. crashed and burned near Hanoi, Indo-China, Apr. 16, killing 26 persons.

Bridges Overseas Airways Corp. reports net profits for the first 10 months of its current fiscal year of \$394,000, a \$3,251,200 decrease from the corresponding period last year.

British European Airways began flying Vickers Viscounts this month, adding the turbo-prop transport to Comet jet liners put into operation on BEA routes last year. Company has five Viscounts, 21 more on order.



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## WHO'S WHERE

### In the Front Office

Edward H. Farnes, former Lockheed Aircraft Corp. work manager, has been elected vice president/manufacturing of Pacific Aerospace Corp., Burbank, Calif.  
Dennis E. Fette, former director of engineering and assistant to the president of Jack S. Harris, Inc., has joined Royal Electric, Inc., Jenkintown, Ohio, as executive vice president.

N. George Foley is now vice president of American Brake Shoe Co., New York.  
Harold C. Fellows has been named vice president research of Black Manufacturing Co., Detroit.

Harry R. Goss, former vice president of General Motors, has joined Eastern Air Lines as a management consultant.

### Changes

F. C. Stauffer has been appointed general superintendent of Kears Faxon Corp.'s aircraft fabrication department, Willow Run, Mich.

C. A. DeBennett has been named vice president of the airplane landing gear department, Goodspeed Aircraft Products Division, Allison, succeeding J. F. Leonard, who resigned to join Cessna Aircraft Co. in Wichita. Other changes: W. A. Collins, named to Goodspeed's aircraft drawing and sub-assembly fabric department, and W. H. Bell, now field representative, San Antonio, Tex.

L. M. Goering is air cargo sales manager, Pacific Northwest Airlines.

H. J. Keith has been appointed operations manager for the new plant of Lockheed Air Terminal, Burbank.

Kenneth Arnold has been promoted to engineering assistant supervisor for Lockheed Airlines.

Frederick B. Knapp and Theodore C. Powell are new structural consultants at Cleveland, Ind., Midwest.

James A. O'Brien has joined Suburban & Western Airlines as operations manager. Robert Ross is new assistant director of sales.

Jack M. Rossman has joined the operations department of the Air Transport Aux. at Annapolis, Washington, D. C.

### Honors and Elections

W. J. Kuntz, Jr., British Aviation Corp. executive, has won the 1954 Wright Brothers Medal of the Society of Automotive Engineers for 1954 for his paper on "A New Technique for Investigating Jet Engine Compressor Shell and Other Turbine Characteristics."

Martin Galand, associate vice-president in charge of Military Research Institute, Kansas City, Mo., has been designated to NACA's committee on aircraft construction.

F. H. Channing, general manager of the Air Transport Division, Ralston Equipment Agency, is celebrating his 50th year in flight transportation.

## INDUSTRY OBSERVER

•USAF Saboteur pilots in Korea report they are now able to outmaneuver MIG-15s at high altitudes with the additional thrust available in turbojet F-86 engines. The General Electric J47-27 that powers the F-86B has well over 4,000 lb. thrust. Saboteur pilots report that MIG-15s are spinning out of sight faster at high altitudes trying to follow transverse the new Saboteur can make with on turbojet.

•Recent British reports that USAF is considering building a British medium bomber in the United States—probably the Avro Vulcan or Vulcan Vulcan—are considered good news propaganda by the Pentagon. USAF believes it is well ahead of RAF on medium and heavy jet bombers.

•United Aircraft Corp. finally has confirmed in a letter to its stockholders Aviation Work's prediction (Feb. 4, 1954, p. 11) that the North American F-100 (Saboteur 47) will be powered by a Pratt & Whitney J37 turbojet.

•Douglas Aircraft's logistic crane designed for a 100,000 lb. payload will be designated the C-112 and is scheduled to be powered by four new Pratt & Whitney turbojets delivering about 15,000 equivalent shaft horsepower. The new P&WA turbojet is based on the split-compressor design featured in the J37 turbojet.

•Defense Department has confirmed the Navy's report to Aviation Week (Mar. 14, p. 11) that the \$154-million Westinghouse A40 production program for Ford's Lincoln Mercury Division at Kansas, Mich., has been canceled.

•Convair XP2Y-1 Sea Dart delta-wing water-borne fighter with a hydraulic landing gear made its first test flight recently, remaining aloft over San Diego Bay for about 16 min. Control test pilot Sam Sherrin was at the controls.

•Part of the three Republic Aviation F-500s being developed as three test beds for supersonic propulsion will be shipped to Edwards AFB in flight testing this summer, with the other two planes scheduled to follow shortly. The F-500 program is a joint USAF-Navy venture to test high-speed propellers developed by Curtiss-Wright, Aeroquip's Division of General Motors and Hamilton Standard. An Athena T54 turbojet will power all three F-500s. One of the propeller systems will use two sets of three blades, all rotating in the same direction with controls geared to reconvert the torque.

•NACA is doing basic research at Cleveland on application of atomic power to aircraft propulsion. NACA's research does not involve a nuclear reactor but covers turbines, compression and heat transfer problems.

•British Aeroplex Co. of England will announce shortly plans for new versions of its Britannia turboprop transport. They are the Mark 200, a four-engine Mark 250, a mixed passenger-cargo version, and the Mark 300, a passenger model. All of the new versions will feature an extra 30 ft. added to the original Britannia fuselage, gross weight of 135,000 lb., and payload of 10,000 lb. Higher gross weight made possible by the new Postage Mark 300 rating of 4,150 chp. BOAC has ordered three Mark 200s, Qantas six Mark 300s.

•First contract for offshore procurement of Hawker Hunter fighters is scheduled to be signed in May soon. Final arrangements will call for more than 5,000 million to be allocated for the project, including production by Hawker in England and building the airframe main lobes in Billings by Fokker.

•Airline pilots are divided on the question of turning on wing interdetection lights for anti-collision navigation. Some pilots report that these lights tend to create an optical illusion in which direction the wing-tipped plane is traveling.



that a controlled auto-rotational landing can be made within five minutes after an engine flare starts.

The new zero-emissions requirements also include:

- **Fire protection.** Additional fire protection for zero-emissions is required in Sections 48.401, 48.404 and 48.405 amendments. Newly certified air planes must install a new extinguisher in the baggage Zone 1 and baggage accessible area in Baggage Zone 3. Airplanes manufactured after June 30, 1974 must have fire resistant lines to protect overhead wiring systems and other fire extinguishers in Zone 1 or the baggage accessible area in Zone 3.

- **Aircraft weight.** Amendment of Part 3 dealing with zero-emission aircraft in normal, climb and descent categories limits its applicability to planes weighing a maximum of 12,500 lb. or less and

maximum flight manual requirements for airplanes of 6,000 lb. or less. However, comparable information is required to be provided in placards, markings or manuals.

- **Inspection procedure.** Aircraft manufacturers and building Civil Aviation Administration production certificates are required by an amendment to Part 1 to establish approved production inspection systems for their products within six months after issuance of type certification for it. This amendment also delegates inspection responsibilities to manufacturers for certified products.

Industry spokesmen took a dim view of this amendment in its proposed stage last fall as an attempt by CAA to force all manufacturers to get production certificates, issued on a voluntary basis last October.

## Let Investors Share Air Profits: Damon

Just about everyone connected with an transport except the aviation insurance industry is making money, Ralph S. Damon, president of Trans World Airlines, says. And if government policies that hold down airline profits do not change, the carrier will be disappointed when they try to lay new, better equipment.

Damon says air progress the last 15 years has benefited:

- **The public,** which gets lower, cheaper service.
- **The government,** which now has available the "best system of air transportation in the world" by postal service, commerce and defense. Two hundred and thirty-five planes of a total

estimated fleet of 650 modern turbo-prop transport have been assigned to the U. S. Civil Air Reserve.

- **Airline employees,** who have shared in improved wages, job security, pension plans and other benefits.

Only the investment by Damon says TWA dissipated \$1.1 billion below fares on a gross of \$112 million on its transcontinental routes in 1952, with a net-washly net rate. For the same period, its International Division posted \$100,000 profit before taxes on a gross of over two \$45 million. The carrier president says the low profit on inter-continental operations resulted from CAF's sharp cut of frequency and rates in the division. He hoped that CAF's present "mercenary view" would be changed.

**No Jet Yet—Damon** told the Aviation Writers Association in New York this month he would like to see U. S. non-jet transport and airlines overcome Britain's jet lead in a real head-on fashion, without government subsidy. This would be possible if government penalized industry for receiving a larger share of its earnings. But if there is no other way for the U. S. to develop jet transport, Damon indicated he would accept government support, although reluctantly.

Looking into the future, Damon says TWA is not sure to go into either jet or turbo-prop operations. He is pessimistic about the ability of jet transport to operate at a profit in the next few years. "It will probably be eight years before we see jet transport in major than taken service," Damon said, "unless political considerations keep them going."

On purely economic grounds, he thinks turbo-prop transport, including the Comet 3 and other designs now on the boards, will still be the way. High fuel consumption of jet planes would prevent their economical operation.

- **Turbine Race—Damon** expects jet transport to be limited to long-haul, high-density routes for some time to come, except where "political considerations" apply.

TWA is working with interest British European Airways' service with turbo-prop Viscounts. For the time being, however, Damon's line is not making any definite between turbo-prop and turbo-jet. "We are waiting to see which line was the race," Damon says.

## Fred Lee Approved

Senate Interstate and Foreign Commerce Committee last week unanimously approved the nomination of Fred Lee as Civil Aeronautics Administrator and Senate confirmation appeared assured.



NEW AIRCRAFT TRANSPORT, the Chase C-121B, carries 61 fully equipped troops.

## New Chase Carrier Makes Debut

By Henry Lefler

West Newton, N. J.—The multi-engine Chase Aircraft C-121B multi-transport made its first public flight here last week before U. S. and foreign military observers and the press. Gen. Homer L. Sanders of the United Air Command, Langley Field, Va., where the first C-121B will be assigned, was among the spectators.

Infantry troops from Fort Dix and National Guard units helped demonstrate fuel loading and unloading capabilities. The plane is designed to carry 61 fully equipped military troops in dissemination, 62 administrative staff or 100 paratroopers. The C-121B's sharply rising tail, up the power-actuated ramp and over the 3,570-in. high lip is approximately one minute the troops were inside and outside. Unloading was just as fast. Fuel tanks and tanks were quickly loaded and unloaded.

- **Staff Flight—Flying a test** Chase chief test pilot Robert M. Howie demonstrated the plane on site of and land within 1,000 ft.
- **This was** the first flight the Aviance series had had. At Eglin Field, Fla., the XC-121 came out on top in USAF's rugged assault transport evaluation in 1946, beating the Fairchild C-119 Packet (strapped down) and the North op C-121K Kiowa. Chase's XC-121 was second.

In the Mexico Airport demonstration last week, the C-121B was flying high and strong power reserves. But its short-field characteristics still were apparent. The transport is designed to take off and land over a 30-ft obstacle in 1,350 ft and 910 ft, respectively, at its standard gross.

- **Rolling inside—**The interior of the plane is actively uncluttered, with a row of seven-and-a-half-inch seats

slung over each and a line of lock-back units down the middle.

- **Cargo loading** is simplified by the ramp, rising about 2 1/2 ft to the cargo deck's base. Tie-down rings, set on a 16-in. grid pattern, can take 10,000 lb. load.

For hospital use, the plane can carry 50 litter patients, six ambulatory patients and six medical attendants. Close-up views show the conversion from assault or cargo transport to ambulance plane takes just a few minutes, with necessary equipment all contained.

- **International Interest—Foreign interest in USAF's new assault transport is warm,** according to Michael Strickoff, founder and chief engineer of Chase, who says Taurus is ready to place an order for 15 planes. USAF has approved, but Strickoff is building off-airline conversion—a midway on Chase's new 32-million plant at Miami Airport and in two other reasonably low delivery sites.

Mexico, India and Australia also are interested in the C-121B. Strickoff remembers an air attack in Washington, Genoa Capt. Derek Kingwell, said American West the plane's short landing and takeoff run had proved impressive.

- **Chase and Kaiser—**the Force has ordered a "very substantial" number of C-121Bs for Tactical Air Command and the Army. First production C-121B was built at West Newton, but manufacturer of the AF order is scheduled for Kaiser's Willow Run plant. (Kaiser obtained a 49% interest in Chase in the merger of the two companies; but Mrs. Strickoff retains the controlling 51%.)

Chase, although holding the prime contract, will act as a subcontractor, supplying sub-assemblies for Willow Run. First Willow Run C-121B is expected



HO4S COPTERS IN ACTION

shown in flight as the new Navy HNSC-1 (above) and the Air Force Paratrol TH-21 (left). The new of the HNSC-1, taken on its first flight, shows the mounting of an H-24WA K-340 engine behind the rotor and drive of the rotor. When it's built, the machine rotor could and it designed to carry considerable stores. The Paratrol TH-21 Work Horse is now demonstrating its "flying crane" ability by carrying a 2,200 lb. Army Signal Corps communications load along behind the fuselage. This load-carrying factor was demonstrated to the public for the first time during recent collection of the company's 10th anniversary of the initial flight of a Paratrol engine, the single-seat, single-engine PVO on Apr. 15, 1949. The TH-21 is the latest U. S. helicopter in production, can carry 12 litters. Rotor speeds 144 rpm.

of the late in June. It is planned to fill lounge orders and use possible outdoor orders for the transport at Chase's West Toronto plant.

► **Blowing Buses:** The C-121B carries 107-120 seats for blowing into transport routes for it. It is equipped for both engine and hydraulic to extend its range. Crew normally will be pilot and copilot/navigator.

► **Flange of the production version differs from the prototype in that the tail has been made higher and squared off at the top.**

In addition to the wing, the C-121B has low side doors for emergency exit. The cockpit, located by a ladder from the cabin, is moved and braced by a straddle bulkhead to protect its occupants in case of engine failure.

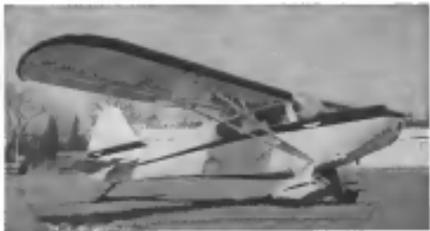
The C-121B can operate as a two-plane, pulling a 16,000-lb globe, or it may be towed, with a without engine nacelles. The prototype fuselage is claimed to be the first ever to be used as a glider, piston plane or jet plane with no change except in wingtips.

► **Specifications:** The C-121B is designed to cruise at 295 mph., based at 55 mph. Top speed is given as 345 mph. and cruising speed is 75 mph. Sea level rate of climb is 1,250 fpm.

Cruise range, with auxiliary tanks only, is 2,073 mi., internal and ferry tanks, with auxiliary and wing tanks, is given as 3,300 mi.

Design gross weight is 55,200 lb., including a useful load of 23,200 lb. maximum gross at 71,000 lb., with a useful load of 41,300 lb.

Wingspan is 110 ft., length 75 ft. 9 in., height to top of fuselage 14 ft. 1 in., wing loading 61.5 lb. per sq. ft. The cargo compartment is approximately 8 ft. high, is 9 ft wide by 37 ft long. Usable floor area is 190 sq ft.



**TAYLORFRAC PRODUCES 193 TONNERS**  
 Like in the latest model derivative Taylorfrac is to come off the production line at Conway, Pa. Priced at \$6,790 at the factory, the 193 Tonnor can be had with one, three or four discs down. Forward

The C-121B is powered by two Pratt & Whitney R1300-9TW engines delivering 1,900 hp at 2,600 rpm (rated) and up to 2,300 hp at takeoff (with water injection). Propellers are three-bladed, three-blade, constant speed, hollow-fiber, retractable solid blades, with 15.5-ft. diameter. Landing gear is tricycle type, retractable.

## House Committee Cuts NACA Budget

Following recommendations of the new Administration, House Appropriations Committee cut \$73 million from the fiscal 1954 budget of National Advisory Committee for Aeronautics for new facilities.

The shift eliminated three projects from the Truman budget (Aeronautics Week Apr. 13, p. 15): \$4,514,300 for rocket engine research facility at the Lewis Laboratory, \$1,378,700 for a variable Mach number tunnel for a 4-ft. hypersonic tunnel at Langley Laboratory, and \$279,000 for an alteration of the test section of supersonic flow facility at Ames Laboratory.

The committee allowed \$52.9 million for NACA operations, compared with \$75 million proposed in the Truman budget and \$53 million recommended by the new Administration. That would operate new facilities, but it would not allow for increased operations of present facilities at the Truman budget.

The House committee allowed funds for three projects:

- **Langley Laboratory.** High-temperature structural research laboratory, \$4, 170,000; boundary-layer control system

- **C-121B.** For \$1.1 million; tunnel, \$1,216,200; 38-in. variable Mach number facility, \$7,771,400; increased capacity for Stratton Road station, \$226,600.

- **Wallops Station.** Replacement of pre-flight jet test accumulation, \$716,000
- **Ames Laboratory.** Extension of speed range of 14.5-ft. transonic tunnel, \$940,700.

## CAA Ends Freeze On '53 Airport Funds

Civil Aeronautics Administration has released \$5 federal-aid airport projects from the construction freeze imposed only in February by the Budget Bureau. The 43 projects all were part of the fiscal 1953 airport program, for which \$5.5 million was appropriated by the 82nd Congress. An additional \$7 fiscal 1953 projects will see similar action.

There has been no change in CAA and Commerce Department policy on the fiscal 1954 airport funds, which have been eliminated from the budget except making a thorough re-evaluation of the airport program (Aeronautics Week Apr. 28, p. 13).

## CAB Studies Cutback Of Air Safety Staff

Civil Aeronautics Board members are considering a plan to close CAB's eight regional safety investigation offices, under the assumption that Washington and reduce their number.

Some airline pilots say this would cripple seriously investigators' ability to reach a crash before emergency-urban transport and lowered accident rate. Advocates of the plan cite:

- **Case backlog.** Each regional office costs about \$16,000 annually.
- **Accident prevention.** CAB could not money saved by the plan to hire such staff experts to improve the Board's ability to investigate and regulate one plus modern aircraft equipment and operations, another proponent says.

## AF Gives 110 T-6Gs To National Guard

An National Guard shortly will get 110 aircraft T-6G training planes from the U. S. Air Force.

Major Gen. Earl T. Ricks, acting chief, National Guard Bureau of the Defense Department, says the two-otter trainer will be distributed to various Air Guard units in quibly as they are established in North American Aviation shops.

With the addition of the T-6Gs, Air Guard will have about 976 planes for maintenance and tactical training.



MANEUVERING for steeply fast landing, B-47 comes up an KC-97 tanker below.



CONTACT MANOE, Stratojet squawks at threat. Note engine cowlings close open.



DOWNNEY HOMES for B-47 are used as patch by crew members who flew on the test

## B-47 Workout

- **Stratojet, aided by jet stream, hits 794 mph.**
- **Bombs from 40,000 ft. during 1,000-hr. trial.**

A Boeing B-47B Stratojet medium bomber achieved a ground speed of 794 mph during a 1,000-hr accelerated test program conducted by Boeing Airplane Co.'s Wichita, Kan., Division under an Air Force contract.

The record-breaking run was recorded when the Stratojet's jet stream was measured into a jet stream at 40,000 ft. while flying from Albuquerque, N. M., toward the Wichita base. On separate missions, a standing flight from Wichita to the East Coast and return, the B-47 used a jet stream area to cover the 75 state miles in exactly 65 min. for an average ground speed of 699 mph.

During the duration the B-47 made 121 flights and covered more than 532,000 mi. under simulated combat conditions which included carrying loads of 14,000 lb. bombs.

► **Standard Mach-1.60 mission averaged 61 hr. each, although some lasted 12 to 13 hr. Longest time spent in the air by the 145,000-lb. two-jet bomber was 14 hr. 25 min. Newly built the mission was flown at night and the plane was refueled in the air four returns by a Boeing KC-97 Stratotanker 60 hours during the day and after dark.**

During its strenuous workout over 30 states, the Stratojet frequently became a target for interceptors, and on one top wide 30,000 ft. over Florida was lured by lightning which panicked four or five small holes in the plane. Although some failures were encountered during the latter experiment, the B-47's flexible wings smoothed out the ride through the thunderstorms.

Simulated bombing runs using radar were carried out in simulated sites at Coaldale, Oregon, Ohio and Florida. On a downer of these "inlets," dummy bombs actually were dropped on the Field AFM bombing range in the Gulf of Mexico. Drops were made from 40,000 ft. and higher.

► **Log 1,000 hr.—Individual missions were flown to Loring AFB, Denver, Colo., and Maxwell AFB, Tampa, Fla., but otherwise the Stratojet took off and landed at Wichita, except when during the plant test Tulsa, Okla., at an alternate where Wichita was closed in.**

Boeing project pilot Ed Buckley and Ed Hertz, spokesman of production flight test activities, say pilot usually stays during the 1,000-hr. program, during which they became the first B-47 to log 1,000 hr. exclusively on the B-47.

## Bell Demonstrates New Model 47G

Synchronized elevator and hydraulic control boost added to improve craft's flight characteristics.

New Bell H-13G helicopters, incorporating more hand control and rotor blade improvements over earlier models and use Dual engine in fuel capacity, are scheduled to be delivered as fast as Air Force and Army.

Joe Mathews, Bell sales engineer, has been demonstrating the prototype, a Model 47G, to the Navy and Coast Guard. A modified version will be available to airlines.

Increased CG Travel—Control hand-off has been improved by installation of a synchronized elevator which works with full tilt of the rotor and assures the engine's permissible center-of-gravity travel by 40%. The Model 47G has a 7-in. CG travel, greater than in any helicopter of comparable size or even in some much larger Bell models.

The elevator is a small metal rod with circular end plates of about 3-in. diameter. Flexible bar about 3/16-in. gage and about 12-in. chord. It is attached at right angles to the tailboom structure, approximately two-thirds of the distance out from the engine.

Power Control—The synchronized elevator and a low-pressure hydraulic power control system, making possible hand-off flight, and other modifications were installed as a result of service recommendations from Army operators of early Bell Model 47 engines in Korea.

Two Hours Hand-off—Turning the aircraft's improved control, Mathews and Bob Dugdale, project engineer, recently flew the prototype 47G hand-off in a two-hour run from Alexandria, La., to New Orleans after turning it out, controlling it solely by shifting their bodies in the cockpit.

The power control was also used, although it was not generally known at the time, on the Bell 47's recent record endurance flight. Mathews reported that the new machine is so much easier to handle for long periods that he actually flew it from Ft. Worth to Atlanta in one day in approximately 50 hr. 30 min. flying time.

Yves Langlois, in pilot on the helicopter will hold the speed for which it is trimmed within plus or minus 2.5 mph and in smooth air, within 2-4 mph, Mathews says.

A longer cruising device is used with a regular lighter control stick between the two. The bottom applies a pressure gradient hydraulically to raise the craft to 1 in. in altitude; stroke the stick to lower.

Army pilots who have tried the new control system say that the cockpit will greatly ease the transition from foot wing to helicopter flying because the luxury features on the stick are reversed and the controls have a feel more like foot wing controls.

New Blades—New high lift rotor blades give the improved machine approximately 20% more climb, Mathews says. A simplified aluminum tail rotor makes development and test for the last three years also unnecessary.

Improved fuel system increases range to 1 1/2 hours to 1 1/4 hours. Fuel is stored in 22-gal. to 14 tank, above the engine mount on each side, so close to the center of gravity as possible. Tanks are interconnected so that both can be filled from one side and so that the quantity in either tank will never differ by more than two gallons from the other.

Weight Saving—It was necessary to shift the center Model 47 battery to a balance under various loading conditions. New CG characteristics are so much better that this is no longer necessary.

A larger capacity battery is fixed in an aft position, to balance the radio installation. This allows tail ballast, saving approximately 12 lb.

Other modifications include:

- Installation of a heavy-duty 50-amp generator and regulator replacing the old 25-amp generator.
- Remounting cockpit Plexiglas bulkhead to allow better expansion space for temperature changes.
- Screen-covered weight spring using new lightweight steel coils.
- Approximately 375 more pitch control is obtained with the same pressure of the sub-trapezoidal pitch by use of a smaller diameter tail rotor control cable drum which results in more powerful sub-trapezoidal pitch. This is structurally possible with new aluminum tail rotor blades.

## MATS Increasing Payload of C-124s

Military Air Transport Service is increasing payload of its Douglas C-124 Globemasters by about 1,500 lb. by removing seldom-used equipment. The modification project is slated for completion by the end of this month.

- Equipment removed includes:
- Fuel oxygen system, 3,300 lb.
  - 90-gal. water tank, 90 lb. for tank and supporting structure (tank full of water weighs about 550 lb.)
  - Fuelable oxygen bottles, 14 lb.
  - Hot cage, 10 lb.
  - Passenger buffet, 64 lb. (from the less C-124s is equipped).

A MATS spokesman said that when carrying troops, the C-124 normally cruises at only about 10,000 ft. Air Force ordered the C-124 design primarily as a specialized belly-cargo carrier and for use as an all-purpose transport.

The new weight-saving project may indicate that the so-called "airline economy" feature in MATS equipment has now a point over those who consider its primary mission as training and study preparation for special military service.

## Jet Runway at Vancouver

A new 5,000-ft. runway designed to handle two Pacific jet transport operations is in specification at Vancouver, B. C., International Airport. The 100-ft. wide runway was financed by the Canadian government through Department of Transport at a cost of nearly \$12 million.

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## STARFIRE POPS BRAKING CHUTE

With its 16-ft. deceleration chute open to slow its landing rate, a Lockheed P-38C jet demonstrated its new jet parachute lander at a California base. The parachute is stored in a compartment above the tail.

# Application of RADIIUM, FLUORESCENT AND PHOSPHORESCENT LUMINOUS MATERIALS



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CANBERRA'S high altitude capability made effective fighter interception difficult.

## Flying a Jet Bomber in 'Combat'

What do I like to do, as a jet bomber crew in 40,000 ft. alt? Dick Wood, member of RAF's reconnaissance unit, gave American WAFs these impressions after flying in an English Electric Canberra during the recent NATTORE Bomber Command's Lanesville Jaeger King.

**RAF Bomber Command Post, Lincolnshire**—The first requirement for personnel going on a Canberra bombing sortie is to get a stiff physical. My legs, back, blood pressure and ears were checked and I spent one-and-a-half hours in a decompression chamber going up to 37,000 ft. simulated altitude.

Over the tundra, I was issued a fitting kit plus warm blanket, an extra pair of socks and a pressure rest synchronized to an oxygen mask. This rest was to be used to rest the pulsating pressure of the lungs or eardrum of postaltitude failure.

**briefing**—At a post-altitude briefing we learned our mission. The Operation Jaeger King at 40,000 ft. was intended for a target area northeast through Germany; that he had been checked in the north; and that pressure on forces debriefing the northern sector was to be made by providing tactical bombing support. Our target was an airfield near Stuttgart, Germany.

The small navigation, weather and air traffic control beeper was given a significant new signal, the Redu London, denoted the techniques to be used.

Normally the Canberra comes a navigator and a navigator/bombarder seated side by side aft of the pilot. The bombardier usually under the instrument panel and assumes a power position as the nose pit. I was strapped in a wicker-like seat next to the pilot, leaving the bombardier's position seat open.

We took off very slowly a third length of the runway and climbed steeply through clouds with a 200 ft. base. The time we had gone over 55 sec we

were in bright sunshine at 40,000 ft and still climbing. The pressure control valve automatically maintains constant cockpit pressure about 14,000 ft with a barometric altimeter bleed from the pilot's health-saver arm pressure. Cabin pressure at 40,000 ft was kept at an equivalent of 15,000 ft.  **Canberra Cockpit**—With the seat not showing under the cockpit, and particularly at night, it gets extremely cold. Down to 17 deg. inside and -62 deg. ft. outside. The seat's glow is the same faded glow as our sock area as there is no heat in insulation. Overhead, the sky is almost black, lightning to a whitish blue on the horizon.

In the cockpit there was only a slight haze from the Arons and no horizon—on fact at this altitude there is no sense of movement, just a constant feeling of hanging in space. Pilot's view is excellent ahead and down. Slight upward movement gives him unsway-napped downward view. His seat is slightly offset toward the center of the plane to avoid vibration.

In the Canberra's cockpit, forward of the "elevator's" upper control column, is the black dial panel with Master-panels on the port side. On the pilot's left is the control console and on the starboard side are the engine instruments.

The blow escape is of swivel construction with VEF seats supported on both sides. Dry air de-icing is available, but a small patch of ice formed during this flight on the top of the canopy between the points of transparent material.

**Fighter interception**—We departed at well over 40,000 ft by way of Lincoln, Lanesborough and Stratford. If, then, there had been no sign of fighter interception which was expected to be supplied by Allied Air Force Control Towers. But then after we had descended slightly (somehow we were 43,000 ft.) 50 mi northwest of Stratford, three F-86s appeared overhead flying at 9 o'clock. Their turning circle seemed to be too great and they

passed by astern. Several other Sabots then attempted a head-on attack, but they passed astern and shot by beneath our canopy.

No tail warning radar was fitted to the particular Canberra and what we were at last "shot down" a few moments later, our last indication of an attack came when four Canadian Sabots, without past loss behind and broke every above and below.

Despite the interception the run to the target continued, and in fact of bomb's a picture was taken of the aircraft. Climbing back to normal height (altitude will not permit the target to be located) a course was set for home.

**GCA Landing**—Thirty minutes ahead of the altitude we were cleared rapidly from 30,000 to 20,000 ft. at 1000 ft. increments and made an excellent GCA landing in part of a stream of planes. The two-and-a-half-hour flight had cost me just under 1,000 cc.

We had relief, rather unappreciated during the entire trip except for a brief period when certain ground transmitters again were too fast to be reliable. No sleep had been encountered with any of the equipment organs.

Outstanding feature of the trip had been the ease with which the Canberra landed at all altitudes from sea level to well over 40,000 ft. The flight had been also to riding low down with a lightly loaded, powered fighter. This is accounted for by the Canberra's clean design, wing loading less than 50 lb./sq. ft. and special spring leg stress.

**New-Style Canberra**—The Ministry still officially gives the Canberra's ceiling as "above 40,000 ft.," although government spokesmen have stated that it is over three miles. At 40,000 ft. the airplane is as desirable as any Western fighter, including the Sabot, can get at it. To add insult to bombier and fighter carriers, Canberra has been ordered to operate at fighter level and not to maintain its class. Even under these handicaps interception was the Canberra's other than the rule. Besides operating Canberra as

consider that they can meet any fighter opposition by climbing, maneuvering or turning into the fighters as they approach from under three or five o'clock. The Canberra is known to be faster than the Meteor and have a greater rate of climb than the Sabot. More than 100 Canberrars can be seen.

**New Bombing System**—When we returned, the Canberra was the lack of a type code for the sideline. It is, nevertheless, a redesign as a three-seater with a bombardier's nose panel. This has been suggested in the B. Mk. 2 with perfection of a new blood heading system that replaces old target marking methods. Then the Canberra can po-

point its targets accurately in any weather as at night. The new system was used in Eastern Jaeger King and in the final attack on the Newmarket bombing range Mar 21, when the largest single force of Canberrars ever operated attacked with positive results, hitting the target through fifth cloud. The planes bailed out five minutes or more for approximately five hours.

**Blood Problem**—Greatest problem in high-altitude bombing has to be flight using the Canberra is a serious problem not restricted to any one type is the large margin of error possible using ordinary beeper.

An Air Chief Marshal Sir Hugh Lloyd

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## Aviation Safety

### Cornell Center Sets up Targets

Progress in expanding aviation safety research has reached a point where there no longer are any major gaps in fields being attacked by researchers. The third annual survey of the House and Florence Congresses Aviation Safety Center at Cornell University reports.

However, the problem of getting available research data to safety designers and operators and into practical use still is serious. This particularly is the case, the survey finds, in the field of human engineering, whose physiological and psychological studies have revealed much useful data applicable to making aviation safer.

While the center has announced its campaign to "push safety and the safety team recognizing the important lack of points out that knowledge now available needs to be presented in a form more directly applicable to aviation problems.

• **Good Record**—The 1972 accident death rate for domestic jet carrier operations was the lowest yet achieved, 0.35 per 100 million passenger miles. It is an outstanding improvement over the 1.3 rate in 1971 and is lower than the last year (1971) reported for all-lead passenger train fatalities, a rate of 0.45 per 100-million passenger miles.

But international air transport fatalities increased to a rate of 3.1, compared to 1.4 the preceding year.

Nonscheduled air transport had a rate of 2.1, a sharp decrease from 7.4 in 1971.

• **Crash Protection**—Personal flying accidents and death rates for 1971 and 1972 show only a limited improvement. There were 750 deaths in 1971, compared to 679 in 1972.

Data now is available on crash-resistant fuselages—such as strong torso, belts, shoulder harness and structural design fuselages—that call for more gross cabin pressure by the safety to make the hundreds of transport flight.

New reported operations of more than 500 million passenger miles by the Military Air Transport Service and other carrier operations without a fatality. No other New accident data, including carrier or other flight operations, was disclosed.

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crew to maintain alert and operate more efficiently.

• **Support of proposals for creation of an Institute of Civil Aviation Medicine**—is essential to the nation's development of an engineering and aviation research by government and industry, there is only one agency (Civil Aeronautics Administration) with key staff personnel for the many problems of crew aviation medicine.

• **Protection of plane occupants from crash loads applied in any direction**—National Advisory Committee for Aeronautics is planning a series of five more tests on seats with several directional loads in order to establish protection for cabin and seat design.

• **Further research and testing to improve facilities for evacuation times** are aircraft, due to crash fire hazards.

• **Control of airplane firm by equipment crucial in the aircraft.**

• **Industry attention to NACA and CAA studies on reducing fire ignition sources** through fuel tank drainage to withstand crash depressions and structural tank configurations, both for new designs and existing transports.

• **Further research to correct external security noise problems**, including public aviation faces the issue as a former detrimental to the orderly development of aviation.

• **Continued industry and government studies of aircraft components and the operational procedures** used with data on accident prevention.

• **Further research in equipment and crew training for emergency situations.**

• **Research leading to adoption of all-wood seats for stress saving lessor damage and collision avoidance for commercial as well as military aircraft.**

• **Attention to stability, including**

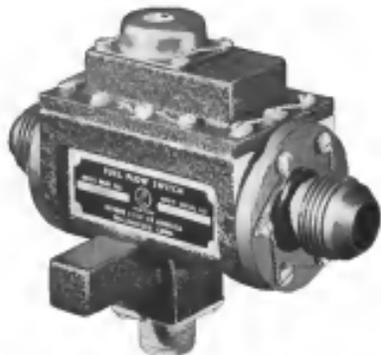


SIKORSKY H-19 COPTER HELPS BUILD BRIDGE

The versatile helicopter in this case the Army's big Sikorsky H-19, is now assisting a helipad at assembly of a Bully Bridge at Fort Rucker, N. C. It is used to be the first time a copter has been used to put a Bully Bridge together. In the photo,

the H-19 is seen approaching the structure carrying a beam, while at right the craft has lowered the steel into place.

# Revere FUEL FLOW SWITCH



## SIGNALS INSTANTANEOUS WARNING OF PUMP FAILURE

Specially designed by Revere Corporation for use in the main fuel pump line of the McDonnell F2H twin jet, carrier-based fighter, this precision instrument automatically signals warning of pump failure whenever flow falls below 1.0 gpm due to abnormalities or mechanical breakdowns. As flow diminishes, rotating and calibrating magnets force a pointed aluminum wire toward a closed circuit position, actuating heretofore sealed magnetic switch. Increased flow automatically opens circuit. This unit is unaffected by altitude or other pressure and temperature changes. Primarily designed to indicate a rate of flow of non-corrosive liquids in aircraft, the Revere Flow Switch can serve industry wherever a pump failure warning system is desired.

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Operating officers of the Guggenheim Center are Ed. E. F. Wright, chairman, executive committee, Jerome Lederer, director, and K. M. Woodson, administrator. —AMdS

## United Air Lines Plans Giant Loading Dock

An elaborate double-deck loading dock designed to meet passenger, baggage and cargo handling is being studied for initial installation by United Air Lines.

The dock is to be located at one end of a White Plains, N.Y., station that the aircraft could be easily towed to a nearby servicing area where it could be serviced with fuel and oil from bi-directionally retractable stands. Other services would provide showers, gasomatic air and electrical power. The layout would employ exhaust heating to keep it free of snow and ice and would eliminate the need for many of present servicing vehicles required.

The passenger loading ramp would contain a waiting area, office, lavatories, storage space for cabin supplies and vacuum cleaner equipment. An area for pre-positioning loads prior to loading aboard the plane would also be included.

Although the subject is still in the planning stage, according to D. F. Maggard, UAL vice president-transportation services, it would simplify and accelerate many ramp activities. Aircraft maintenance, he said, would be conventional compared to purchase and upkeep of present ground equipment. Design of the unit was by F. D. Clayton, airport engineer of the airline's Denver, Colo., operating base.

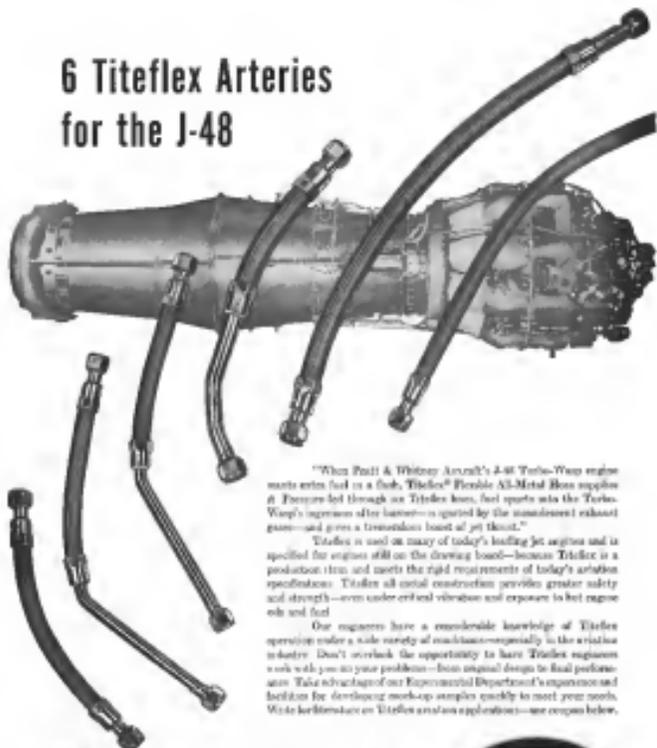
## Ansett Fits Jets To DC-3's Fleet

(McGraw-Hill World News)

Melbourne—Ansett Airways plans to modify its DC-3s by fitting them with small French-designed Turbomeca gas turbine auxiliary powerplants to boost takeoff power. Installation of these engines will permit the carrier to extend the plane's range to as far as of the wings, thus making room for 16 seats and lowering gross weight some 1,500 lb. The plane now fly on a company basis with 25 seats.

The Australian Federal Dept. of Civil Aviation is cooperating with Ansett and the Commonwealth Aircraft Research Laboratories on the program. Plans of tests will be made available to all Australian airlines.

## 6 Titeflex Arteries for the J-48



"When Pratt & Whitney Aircraft's J-48 Turbo-Prop engine enters into full-scale production, Titeflex's Flexible All-Metal Hoses supplies 6 Pressure-Relief hoses on Titeflex lines. Fuel supply into the Turbo-Prop's compressor after burner is operated by the unmodulated exhaust gas—and gives a tremendous boost of jet thrust."

Titeflex is used on many of today's leading jet engines and is specified for engines still on the drawing board—because Titeflex is a production item and meets the rigid requirements of today's aviation specifications. Titeflex all metal construction provides greater safety and strength—even under critical vibration and exposure to hot engine oils and fuel.

Our engineers have a considerable knowledge of Titeflex operating under a wide variety of conditions—especially in the aviation industry. Don't overlook the opportunity to have Titeflex engineers work with you on your problems—from original design to final performance. Take advantage of our Experimental Department's experience and facilities for developing mock-ups quickly to meet your needs. Write headquarters on Titeflex aviation applications—our coupon below.

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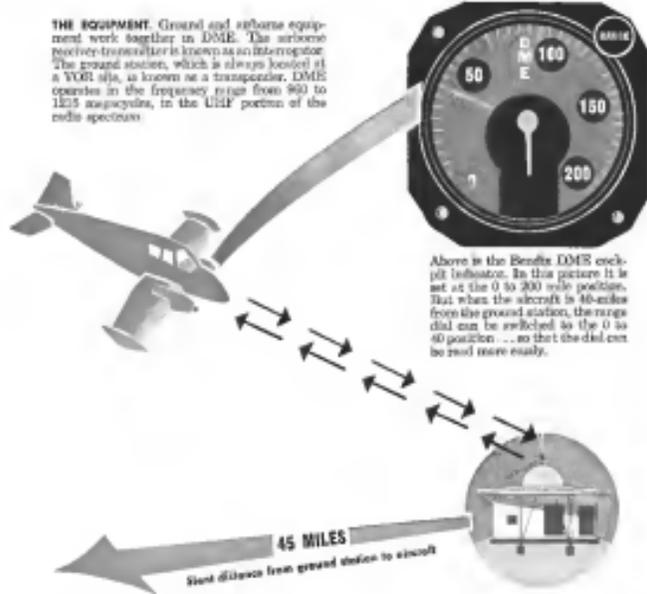
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Above is the Bendix DME cockpit instrument. In this picture it is set at the 0 to 200 mile position. But when the aircraft is 45-miles from the ground station, the range dial can be switched to the 0 to 40 position... so that the dial can be read more easily.

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You're now hearing about DME since 1960. Now it's available. Developed by Bendix Electronics. Flight tested. Ready for installation by Bendix Radio. It's the airborne (DME) equipment that accurately measures the distance of a plane from a ground station. All our work with some 300 VOR and ILS ground sites that have been installed in anticipation of the DME development, that had to come in system navigation.

#### Reduces operating costs

DME is a brand new navigation and safety aid. But even more, it brings possible reduction in operation costs. DME can save you fuel you can pick up and see. DME/VOR brings savings in fuel consumption... flight time convenience to passengers, better flight control.

#### Holding at Unmarked points

Holding for the big and crowded airports is no longer limited to major interstates, holding facilities or airway markers. With Bendix DME, aircraft can now hold at any point within range of a DME/VOR station. Holding patterns can be tighter, closer in, more accurately executed. Holding can now be an actual distance covered, not an elapsed time. No more need for wobbly side-arms "Buffer Zones". Holding away from airway interstates, means less, that through traffic can go by without delay.

#### Unmarked airways

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point. Are there obstructions near the airfield? A clearance issued? A single model? The latest may show them. Your Bendix DME/VOR provides a reliable way to determine that the obstacle has been passed on an approach... and that a let-down may be safely started.

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And as pilots become more familiar with DME/VOR many other advantages will be developed. Bendix DME is another great step forward in aviation navigation. For further information, write to Bendix Radio, 2130 North Charles Street, Baltimore, Md.

**HOW IT WORKS.** The interrogator in the plane radiates a series of radio frequency pulses. These are received at the ground station when they trigger the ground transponder... which in turn, transmits a reply signal to the plane. The elapsed time, in microseconds, between transmission of interrogation signal and reception of the reply signal is used to compute automatically the slant distance between the plane and the point where the ground station is located. No triangulation or other time consuming effect is required of the pilot. He merely reads the distance in miles on the DME indicator on the cockpit. (In example above aircraft is 45 miles from ground station.)

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TOMORROW'S DAY FIGHTER probably will have delta wing, variable nose, lightweight jet, integral construction

More Thrust, Less Weight Are the . . .

## Two Paths to Day Fighter Superiority

Getting more power from engines is no important as 'stripping down' plans for better performance.

By David A. Anderson

We are heading for a new cycle in aircraft development with a type designated as the day superiority fighter.

Seen for the first time in the world for an airplane that will outfly and outlast anything the enemy can put up.

Now under development at many of the major aircraft manufacturers in the country, the day superiority fighter is being designed at the plants of Lockheed, North American and Northrop.

Design Preview—Within the next year or so, the preliminary design will have been started and finalized. The next advances in aircraft construction techniques will be coupled with the latest aerodynamic developments and the biggest, most powerful engines to produce the new breed.

Here's what they can look like:

- The aircraft is built around a delta-wing layout. Two lightweight tubular ribs are slung underneath the wing about halfway out the span. These ribs can be replaced quickly by any construction in the field, as better concepts come along, they can be slung on the same sets of fittings and improve the performance of the airplane faster.
- Top speed of the craft will be over the speed of sound, as high as Mach 1.5. Sea level rate of climb can be up around 30,000 fpm., and operational ceiling will be above 50,000 ft.
- The construction will be largely of integral parts, made in quantity on the new giant presses now beginning to

come their weight felt in aircraft development.

► For Understanding—Perhaps the first thing to have understood about the term "day superiority" fighter is the meaning of the word "inferiority." It has nothing to do with cost of the aircraft, it means the aerodynamic performance of the airplane.

Greatly of the type probably began with the first pilots' reports from combat as MG Alley. It was frustrating for Sabre pilots to be forced into a defensive position to avoid combat at the closing of the enemy. The MG pilot, with a margin of superiority in climb and ceiling, would fight or fire as well, and there was nothing the Sabre pilots could do about it.

To them, MG Alley became a dove, regardless of the superior rate of MG kills run up by the Sabre. You see as you see, and the pilots, by carrying the fight to the enemy, they were not so.

To these early pilot reports was added the insight of opinion from experts like Edward Heintzman of Douglas, who saw its contemporary fighter

explain a trend towards increased cost and complexity which was staggering to watch.

► Factors and Performance—Pilot in Korea consist over the performance difference between MG and Sabre in terms of the night difference. Four thousand pounds of aluminum alloy and steel separated a loaded MG from a loaded Sabre. This weight differential, according to the pilots, could be reduced by eliminating some of the ribs in the Sabre. Duplication of systems, extra gadgetry, unnecessary load up.

In support of this view, one of Heintzman's concepts—growth factor—has been used by proponents of reduced weight. Heintzman pointed out that every pound of equipment added would slow 10 lb. of airplane weight to carry it around. The ratio of ten-to-one was considered as an average for contemporary fighters, although it was noted that the factor could be 15 or 20 for high-performance aircraft.

It is possible to carry the use of this ratio to extremes, however. It is not an arbitrary number, but an engineering guide. It won't hold as you keep stripping weight out of the airplane.

Take the Sabre as an example. In conservative use of the growth factor would tell you that 500 lb. of equipment out of the Sabre would result in a reduction in gross weight from 16,000 to 5,000 lb. This is not likely.

► Stripping—There are lots of things, the pilots said, that can be pulled out of an airplane to make it lighter. Using the Sabre as an example again, the pilots have compiled a long list of unnecessary items. On this are the self-sealing fuel tanks and armor as being considered an integral part of a fighter.

Duplicate or emergency systems for landing gear extension and for the primary fuel systems could go. So could many operations of the canopy. So could parking brakes.

Then, the pilots said, if the airplane could be stripped of that extra equipment, it should be possible to reduce the structural weight required to carry that stuff around. You wouldn't require as much room inside the airplane, and that would mean a smaller enclosed volume for landing gear and wings.

A smaller airplane would also be a lighter weapon. So this kind of thinking has led to the idea of the "stripped-down" fighter for day superiority, an idea that is backed by almost everybody in the FPA, the Korea war fighter, the combat air war in Korea.

The pilots say they want an airplane that will outperform and outlast the MG's superiority. This means performance at the high end of the horsepower spectrum (Mach 1.3 or so) and a battery of engines.

But is it still the stripped-down

## World War II Light Fighter Designs . . .



ZERO 1941 by World War II fighter (one in U. S. markings) carried two 20-mm. cannon, two machineguns, weighed less than 6,000 lb.



XP-77 Bell powered the XP-77 prototype with Ranger engine, armed it with 20-mm. cannon, two 50-cal. machineguns.



F8F-1 Grumman Bearcat carried four cannon in rugged airframe that weighed less than 3,000 lb. Engine delivered 2,500 hp.





**AVIATION PROGRESS MARRIED**—Here at Kitty Hawk, N. C., the aviators would someday pull cables to the Wright Brothers for their achievement of powered flight

in a heavier-than-air machine in 1903. And among the aviation pioneers taking part was Igor Sikorsky, whose aircraft have made a major contribution to air progress.

## AROUND THE WORLD WITH THE FLYING JACK-OF-ALL-TRADES



**ROTARY-WINGED PACK TRAIN**—Airlift of vital construction materials, key personnel, and survey teams is routine on the Alaskan Company of Canada's vast road-building and power development project in the rugged Kluane region of British Columbia. In a few hours big Sikorsky HO4S-1s, operated by Sikorsky Helicopters, Ltd., can load loads which trains would need days to deliver.



**EASY DOES IT**—A big H-19 Sikorsky eases wounded men gently to the lava in front of the Naval Medical Center in Bethesda, Maryland, making a heavy flight which lands on the battlefield. Regular transfer of Korea casualties arriving at new military air terminals in the U. S. direct to surgical hospitals is planned by the Military Air Transport Service.



**"KEY PRO"**—Ministering to the spiritual needs of men at sea is often difficult because of rough seas and the distance between ships in a fleet. But with helicopters such as the Sikorsky HO4S-1 shown above, chaplains can move from ship to ship with ease and come aboard by landing or by rescue hoist.



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or better, vertical shock and climb is possible.)

► **Power Base**—Examination of this ratio suggests that boosting the thrust of the Sabre as any other contemporary fighter would improve the T-7W ratio and thus make it a better MIG-matcher. In theory this works out well, but in practice, the huge thrusts needed can't be achieved by the usual schemes of liquid injection or afterburning.

So it is possible to conclude that stripping a Sabre of weight and boosting the thrust would improve the performance somewhat, but not by enough of a margin to give it a clear edge over the MIG.

The same philosophy holds for any of the newer fighters you can't take a Sabre as a Strake or a Thunderbolt and strip it down with one last effectiveness.

The best way to develop a fighter with a high thrust-weight ratio is to start from scratch with some new concepts. The basic fighter facts of life are few. You need a gun battery with an effective lighting system, an instrument to house the battery and pilot, and a powerful engine to get the work to the canopy. Everything else goes along to correct the functions of one or the other of these parts.

► **What Has Been Done**—These primary needs have been known for years now, and have been paralleled into some very interesting layouts in the past. Probably the lightest fighting machine ever built was the little British Gloster Gladiator, a World War I fighter which weighed in at 515 lb. guns with enough fuel for three hours and a Lewis gun in battery.

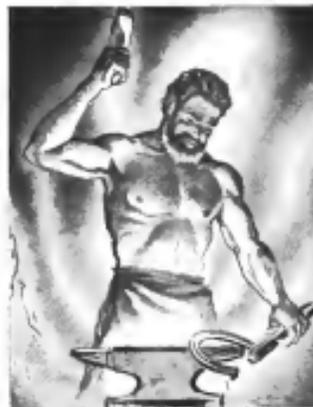
More recently the Germans tackled the problem in their last-ditch Heinkel 162 "Volfssturm" (People's Fighter) a scaled-down-and-scaled-up sword with performance equal to the jet fighters of the immediate postwar years.

Currently entering flight test in England is the P-530 Comet, a design of W. E. W. Paves, master of the English Electric Canberra. The Comet is expected to weigh in under 4,000 lb.

In this country, Lockheed, Northrop, North American, Douglas and Grumman have been reported to working on fighters in the stripped-down category.

► **The Big Strake**—In all these designs, the necessity of the structural demands and aerodynamicity will come in combining where the engine manufacturer can come through. With the engine representing the biggest single chunk of weight in a current layout and, of course, providing the only thrust, the paramount worry of every designer is it going to be in jet or engine or some combination thrust-weight ratio.

Right now, such engines are not in quantity production in this country



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Our new "Hot Facts on Forging" Pamphlet explains Utica's methods and facilities for producing forgings, now readily engaged in jet blade production, but widely generally available.



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or altered. Our engineers are working around a rate of two in three. The latest Kollsman Avion is just a few weeks old, the highest rate of any subject known to us at this writing.

According to one top engine company executive, there is no military requirement for such an engine. He finds in developing such a prototype on its own, he said, and he is confident that other engine manufacturers are doing the same.

So it appears as if the engine and release designers can only start from the legacy and at the same level for these new fittings.

### Wide Peace Use Seen For Earth Satellite

The military adoption of an artificial satellite has been greatly accelerated, says Henry Ross, member of the British Interplanetary Society.

Speaking before the Midlands Branch of the BIS recently, Ross said that if it were possible to gain a satellite vehicle into an orbit, it would be possible to shoot it down just as easily.

But there are many and varied peaceful uses for such a satellite, Ross said. There is time he detailed them.

► **Fuse Small Satellites**—In the appropriate future, small instrument-carrying vehicles are likely to be developed. Perhaps the first would carry only a satellite balloon, and go to show it, say, that it would not be a substitute for radio waves. Such a device could be valuable for investigating the propagation of radio waves.

The next step would seem to be a larger vehicle—perhaps twice the size of the Cassini V-2—which could carry a useful payload of about 50 lb. of instruments into an orbit several hundred miles up. At a height of 500 miles, the artificial satellite would have a velocity of 4.66 miles per second and would circle the earth once every 100 minutes. Data on cosmic rays, solar radiation, and similar measurements could be transmitted back to earth as long as power was available.

The next step would be the provision of electrical energy from the sun, either by a conventional sun mirror-solar-batter system or, more probably, by means of a mirror and thermocouple.

► **Kollsman Satellites**—At an orbital height of 22,500 miles, with an orbital velocity of 1.9 miles per second, the satellite period would be equal to that of the earth. Any vehicle in this orbit, assuming a west-to-east movement, would appear stationary to a ground observer. Three of these satellites suitably situated could act as television relay stations and would be sufficient to cover the whole globe.

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would bear its transmission to one of the satellites which would re-transmit it back over a wide angle. Power required for the re-transmission would be remarkably low, depending on the size of 1.7 kilowatts for each station, and flow.

Telephone relay stations could be set up before manned space flight is possible, but the nature of current equipment means that breakdowns would be certain to occur. It is possible to build up space circuits with automatic switching in case of a fail, but this method could not be expanded indefinitely and some or less saving or replacement of equipment would be essential.

This conclusion leads to the next step—a manned satellite. Such a station could act as a television and short-wave radio link as well as a search laboratory.

► **Unique Properties**—A satellite has unique properties among man-made laboratories. For example, the sea state of the full tilt is irrelevant on a satellite. Open space is almost a perfect vacuum and many experiments requiring exceptionally high vacuums could be attempted.

As astronomical and astronomical observatories, these manned stations could prove very useful. Clock work could be kept on the world's watches and many would make accurate observations of one long term forecasts to be made.

The atmosphere of the earth has always been a major obstacle to astronomy, and even earth telescopes set up on a satellite would prove exceptionally useful. Many of the details of the moon and the planets could be studied in such a laboratory—John Thompson.

## Broader Education Urged for Engineers

Engineering education needs to be expanded into liberal arts and the humanities, said Lillian G. Mead, president of the Society of Women Engineers at its 1953 National Convention held recently in New York.

"This great faculty of people that gets the narrow branches of the mechanical," said Miss Mead, "should be given a concrete basis of education and a broader field of vision before they are permitted to enter some field requiring skill and operation on the part of an untrained mental part of the overall staff."

Miss Mead urged educational leaders in colleges and universities to take careful steps of the lack of understanding caused by education of engineering from the arts and humanities. Engineering and other professions must be able



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THESE GREAT WORKS THING for Boeing's L-1011 Stratojet—the largest jet put into production—on an example of Ryan leadership. Each of these huge birds, comparable in size to the fuselage of the Stratojet, requires over 30,000 aircraft parts with and also advanced production techniques developed by Ryan.

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to make themselves understood to allow for a greater variety of support.

"We used this feature, and the place where we would actually find it would be under the guidance of our structural instructions," Mrs. Brand concluded.

## Jet Tips Make Helicopters Safer

Dramatic proof of the safety of a jet propelled helicopter, due to stored kinetic energy in its rotor, has been furnished recently by an accident involving the helicopter Aéro III, according to a report by Sicaud, the French aircraft manufacturer.

During takeoff for a flight test, the circulation conditions of the tip of the blade suddenly ceased operation. The jet helicopter was then at an altitude of approximately 60 ft and flying at a low forward speed—a critical region for standard helicopters, Sicaud says.

But the pilot was able to get the aircraft into autorotation without any change in rotor rpm, and to track the ground without incident. Incidentally after impact, the front wheel of the cyclic landing gear became caught in a deep rut and tipped the fuselage about 30 deg. The rotor blade tip damaged the tail of the rotor, but the tips of the metal rotor blades were undamaged.

Sicaud says this accident has proven the safety features of the aircraft and the high resistance of its rotor blades. The firm contends that a conventional helicopter in a similar accident would have been completely destroyed.

## Flight Safety School Started by Air Force

A new flight safety education program for M2 Air Force officers has begun at the University of Southern California, Los Angeles, and is expected to pay off in equalizing latest safety operational techniques throughout the Air Force.

The first class of 23 officers began an intensive course in aeronautical engineering, aviation physiology and psychology aimed at aircraft accident prevention, and investigative procedures. Successful classes will follow at six week intervals for these years and M2 flight safety officers have been trained at the school.

Special Safety-Crews national was contributed by the Air Force, aviation manufacturing industry, commercial airlines, Civil Aeronautics Administration, Civil Aeronautics Board, Flight Safety Foundation, and other safety research agencies.

The officer students are expected and

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By Marvin Mills,  
Sales Manager, Another Writer Again



"Talks easily"... what does it mean? How does it apply to you and your family in this chaotic era of war and peace?

Most of us are too busy or too tolerant to keep ourselves informed on the critical need for a dual defense front against the Soviet threat and Communism at home.

The Reds know our families only too well. They take quick advantage of them at every turn. They even go so far as to abet those families when they hide behind the Constitution to the end that they can destroy it.

Just as we read the headlines, listen to the radio reports, watch on television as the Communists digger deeper into our defense to add injury. Then, because we are opposed to the open shop, we turn to the open shop, we wish to dance to the music of a TV crowd without adding up the score.

From a moment over a map and figure the message from the news: Kansas border law to pass says, note the money-making start this it would take a 1000 a p. I. Red fight to reach you first—if you are what you will do it you have not lost your head before these borders are overhauled.

We all know it can happen. Who, then, are we speaking? Better we listen to the words of best resistance, because it is too easy to let someone else do the worrying and the weal. Unfortunately too many other Americans share our anxiety.

We seem to have a healthy fear along with our anxiety about without realizing that in the great sea the sea who keeps our ship "True" is that down by a Red fighter over Western Germany, but remember as we see the occurrence actually with other planes missing or removed in strange spots.

We hear of some plan, missing documents, withdrawal of party support and capture businessmen psychologically harmful to breakdown. Yet such items are addressed occurrence and if we relate it to a pattern, we do so only vaguely.

I speak here not of the military, nor of administration, but of the rank and file of us. Fortunately, there are some in the nation—the air and the sea people—who are not asleep. Even though they have been denied our brains by a rapid fire, they are the strength that bedrock our weakness.

Take the Grand Observer Corps, an activity as fitting the gaps in our radar screen. To the fact that dozens of posts unarmored or unarmored... a crying need for thousands of volunteers for a few hours each week. If we fail to do the need, who then do we blame if a reinforced bomber slips through low under our electronic fence?

But what do most of us do about these things? Nothing!

We permit the Communist Party to exist, knowing that every member is an agent to cause the Soviet program of domestic destruction... a party, which our work with cells that meet in secret meetings, requiring sophisticated obstacles to activity as the Kremlin.

In our attempts to prevent our own freedom we even defend those who would destroy us as they hide behind the Constitution. Somehow we forget that a government's first objective is to preserve itself. Only then can it preserve freedom.

An older Helmut pointed out, the man who keeps our ship "True" is a crowded theater crowd dined by a man on the ground of a government right to say the occurrence actually with other planes missing or removed in strange spots.

Unfortunately the ranks of the uneducated the F.W.W., the Communist, are not as dramatic as that example. So we have ignored them... and have in addition to the Red schedule Korea who, which keeps our ship at a constant 1000, we see at a struggle on two fronts, whether we know it or not. We want put muscle on our chin. At the same time, we must close our country to the masses who resist it.

Understanding, let us not be deceived, we must do it. We are not so much as we think of our great weakness—public apathy. Think about it.



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## British Raising Jet Transport Production

Production rates on the new British turboprop and turbojet transport aircraft may be the deciding factor in the capture of a faster world market, say some observers.

British manufacturers have resorted to extensive subcontracting in order to expand their production. Some of the new capacity so acquired is being used to build complete aircraft, some for making major components, such as wings, and the remainder for making small parts.

Staff Assessment—In recent several visits to Great Britain, Avionics Week's staff members have been able to assess British production methods. As a generalization, it is possible to say that the British use the same methods as do American manufacturers, but on a smaller scale.

There were three major deterrents to large-scale British aircraft production in the early postwar years: manpower, housing, and machinery. In recent months, most of the machine tools ordered during the first years of the postwar expansion have been delivered, efforts have been continued from European countries and the U. S.

The shortage of manpower and housing continues, however.

How is a standup of the current status of British transport production and subcontracting?

► **DH Comet**—The world's first turbojet transport in service has been in production for several years at the Hatfield plant of the de Havilland enterprise; now two new lines are being developed. The first of these is at the Short Bros and Harland factory at Belfast, Ireland and the second is at DH's Chester plant, the largest aircraft production factory in England.

The Chester line was begun four



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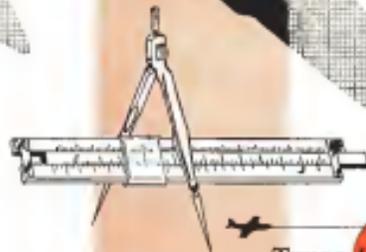
chambers, transition liners,

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cases, turbine casings,

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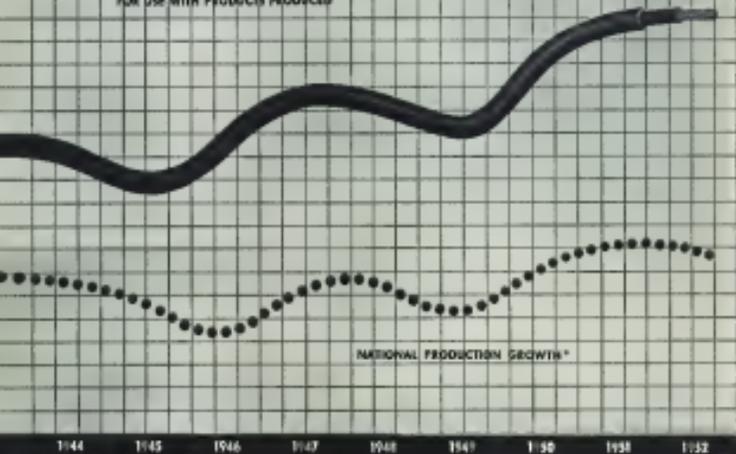
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\*Federal Reserve System Data



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## PRODUCTION



AIRCRAFT INDUSTRY representatives get look at new light-speed milling machine.

## Fast Miller Gives Fine Finish

Machine is tailored to aircraft production, puts cutting of non-ferrous metal parts into high gear.

One of the latest machines specially tailored to meet production requirements recently was demonstrated at Caswell's Video Aircraft Corp's 17, 17th Street Division on the occasion of the successful setting of the Aircraft Industries Assn.'s manufacturing methods committee today.

Representatives of the National Tool Builders Assn. and other interested groups also attended the showing, which was sponsored by the Air Materials Command's Industrial Services Branch, Production and Resource Division.

The machine—a light-speed vertical miller—cuts cutting of non-ferrous metals in high gear. It was built by Cincinnati Milling Machine Co. under an Air Force contract after an extensive survey of aircraft industry requirements. Air Force prime interest in the development was to find a way of cutting cutting costs.

While exact milling machines are reported by Corwin to reach maximum capacity at about 1,500 rpm, Cincinnati's new mill starts at five speed, and can accelerate to 11,700 rpm. Table travel speeds of 375 in./min. are as reported for the new tool, combining with 60 in./min. speeds of standard millers.

Finish on metal cut on the tool is extraordinarily smooth. Information is that the machine will give a finish of

0.00005 in. (90000).  
► **Industry Saved**—Under the contract, some of the principal aircraft plants were surveyed to determine what type of milling machine would be best suited to present and future needs for the aircraft industry.

Survey questions, it is reported, were designed to indicate whether the mill should be vertical, horizontal, position or tool-room type; the general work to be performed; spindle speed and horsepower; feed rates; sizes and type of cutters generally used; table travel lengths; available power ranges; and other specifications.

Plants surveyed included Boeing, Chance Vought, Convair, Douglas, Goodrich, Lockheed, McDonnell, Martin, Northrop, North American and Republic.

► **Speed**—Based on the survey, the machine evolved in a vertical type production miller with an 18-in. wide table having a travel of 45 in. Its specifications show a table feed of 0 to 375 in./min. (heavy shreds 0 to 300 pph); table travel of 450 in./min. (heavy, 300 pph); spindle speeds and horsepower of 1,500 rpm at 11 hp, 3,800 rpm at 28 hp, up to 5,100 rpm at 30 hp for 6-in. diameter cutters; up to 7,300 rpm at 45 hp for 6-in. cutters; up to at least 10,700 rpm at 93 hp for 4 in. and smaller cutters; from 10,000 (rpm); vertical stage of

# To get better prints... faster

**Tapco Plant, Thompson Products, Inc. uses Kodagraph Autopositive intermediates in print production.**



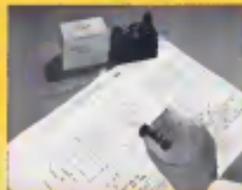
The Tapco Plant knows full well that flexible step prints pave the way for costly reading errors, know, too, that Kodagraph Autopositive intermediates are low cost insurance against such a possibility.

It flexibly reproduces as more critical and complex job and wire drawings in Kodagraph Autopositive Paper Translucent and thus obtains—quickly and easily—spotting "matters" for pre-making which have dense photographic black base as an easy treatment, pressure-quality paper base, which will produce highly legible whiteprints time after time in stepped-up machine speed.

Extremely fine-detailed drawings are reproduced in Kodagraph Autopositive Film, which captures the finest detail large chart lines from "filling in" and provides top-quality photographic intermediate which will produce fine print-back speeds.



No negative step... no drawing handling. Kodagraph Autopositive Paper and Film are handled in exactly the same manner... produce positive photographic intermediates directly. They are exposed in one of the Tapco Plant's direct positive enlargers—or in a photostat unit. Then, they receive standard photographic processing. A fast, automatic room-light operation of the step. And no wet equipment needed.



Autopositive intermediates save creative drafting time. Tapco Plant makes necessary changes in the bank, design without delay involving the 113 Kodagraph Autopositive prints of the original drawing. (21) ensuring the requested detail from the Autopositive reproduction with redrawing film. Then, the draftsmen can only to add the new detail... and a print-making station is ready. One which will produce highly legible prints without disturbing "ghost" images in the replicated area.



Autopositive reduction "over-works" many old drawings that have lost the density or are faded or torn, are transformed into print-making masters by reproducing them on Autopositive Paper or Film. Minor and gross errors are diagnosed and work detail is made more legible—saving losses of re-drafting. Autopositive Paper is also used to duplicate a variety of office records, non-transfer vendor orders, etc.

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Coors, to handle expanded output production, including the new two-beam ECR. Since 1961 more will be completed at this plant, scheduled for occupancy this month.

▶ **Alpha Tool & Supply Co., Clinton, N. J.**, has expanded its distribution of precision-machined British material products to include Canada and Mexico.

▶ **Jack & Hazen, Inc., Cleveland**, received nearly \$300,000 in orders for its aircraft accessories during the period Mar. 1-Mar. 15. Two USAF orders totaled more than \$60,000 and orders from Boeing and Douglas came to more than \$15,000. Present J&H backlog is approximately \$50 million.

▶ **Pacific Aerospace Corp., Chino, Calif.**, has completed its distribution of precision-machined British material products to include Canada and Mexico.

### Navy Contracts

The following contracts were announced recently by the Navy's Aviation Supply Office, 700 Robson Ave., Philadelphia 11.

**Beatty Aviation Corp., Seattle Products** Div., 115 Grand Concourse Road, Red, plane and airplane parts, for contract amount, \$119,712.

**United Aircraft Corp., Chicago Turbine Div.**, P. O. Box 5871, Dallas, Texas, and a fuel nozzle, for contract amount, \$1,000,000.

**Raytheon Aircraft Co., Philadelphia 700**, 4, Lane 4, Philadelphia, Pa. 19104, \$1,117,000.

**General Electric Corp., South West Div.**, 2511 Center St., Indianapolis 1 301 44, \$1,117,000.

**Allen Aircraft Co., 1823 W. 72nd St.**, Tulsa, Ok., maintenance parts for various types, \$11,100.

**Beatty Aviation Corp., Seattle Products** Div., 115 Grand Concourse Road, Red, plane and airplane parts, for contract amount, \$1,000,000.

**Beatty Aviation Corp., Seattle Products** Div., 115 Grand Concourse Road, Red, plane and airplane parts, for contract amount, \$1,000,000.

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## Telling the Market

Manufacturing Cost Control provides breakdown charts, cost control forms and performance curves for manufacturing firms, plus a five-step method of setting up cost-control system. Ask for Bulletin 117-48 from Howard F. Howard Co., 319 Fulton Building, Detroit 2, Mich.

Embedding of electrical components in kenosolite rendering them electrically insulating, dielectric strength, adhesion, low shrinkage and temperature stability is described in booklet available from Minnesota Mining & Mfg. Co., 960 Fargus St., St. Paul, Minn.

Applications of Du Pont nylon soldings are covered in a new series of booklets. Data is also given on molding and extrusion techniques. Write R. L. de Post de Nevers & Co., Willoughby 90, Del.

Plant layout is the third in a series aimed at administrative and operating assistance. Included is an improvement worksheet for evaluating existing layouts. Earlier booklets cover "Material Handling and Industrial Maintenance," "Write Yourself Assistance, Inc.," 15017 Detroit Ave., Cleveland 7, Ohio.

Aircraft acoustical and thermal resistances are described in Applications to Aircraft, a booklet being distributed by Filingsis Corp., Toledo, Ohio.

Methods of optical gaging to cut in inspection and business costs are covered in 32-page booklet available from Industrial Optical Division, Eastman Kodak Co., 311 State St., Rochester 4, N. Y.

Aircraft plastic lubrication facilities and experience at Plastic Age Co. are described in brochure being distributed by the firm. Address: 495/557 Arroyo Ave., San Fernando, Calif.

The New Way to Solder explains resistor soldering and its uses in repair, detection and maintenance. Ask for Bulletin 315-D from Watcom Mfg. Co., Inc., 126 W. Gen St., Joliet, Ill.

Custom molded nylon plastic parts, including tubes showing mechanical, thermal, electrical and other properties of this material, are described in Bulletin CDP-65 available from General Electric Co., General Division, Pitts- field, Mass.

Procedures Through Research is a special booklet which describes techniques used by Ramon Mfg. Co.'s Aircraft Division to describe the research, development and production facilities at

offer the industry, particularly firms in defense work. Write Ramon Mfg. Co., Aircraft Division, 11711 Woodlark Ave., Downey, Calif.

Hardness conversion tables for steel are on a wall-size collated card providing approximate relationship between Brinell, DPH (Vickers), Rockwell and Shore Scleroscope hardness values and corresponding tensile strengths of steel. Data comes from RAE, Inc., 10001 W. 17th St., Minneapolis, Minn. Write International Nickel Co., Inc., 47 Wall St., N. Y. 5, N. Y.

Carbide tipped drills are Made and cutting feeds and application data are covered in 12 page manual being distributed by DeLano Saw & Tool Co., 1114 Kramer Rd., Columbus 3, Ohio.

Utility vice that eliminates a number of holding operations required in setting up work on drill presses, millers, grind out, shapers and other machinery is described in booklet available from Jones Engineering Co., Reading, Pa.

Hydraulic drill units are detailed and charts are given for optimum operation in catalog, from Delta Power Tool Division, Rockwell Mfg. Dept. DC-11, R-4, 400 Lexington Ave., Pittsburgh 3, Pa.

Light Ten tube in bench and floor-type, and quick-change gear and tool change models are described in catalog available from South Bend Lathe Works 425 W. E. Madison St., South Bend 13, Ind.

Spaywelding equipment and techniques using Colsonoy hard facing alloys are described in brochure folder available from Wall Colmonoy Corp., 19345 John R. St., Detroit 3, Mich.

More than 1600 stock units and special assemblies, also electronic and electrical control systems, test apparatus, components, communication equipment line of Sylvania Co., are detailed in 32-page catalog being distributed by the firm. Address is 5701 Reading Rd., Cincinnati 13, Ohio.

## New Addresses

George E. Hantz & Co., sales representing representatives for Adams-Rite Mfg. Co., Co-Operative Industries, Inc., and Electro-Synthetic & Mfg. Co., has moved its office to 1734 North Ellshade, Wichita 14, Kans.

Brown-Lite Corp., Beverly Hills, Calif., dealer of special fittings, ball valves and stainless steeling equipment, has opened a Southwest office at 6514 Col Ave., Dallas, Tex.

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- ... volumetric efficiencies up to 97% over a wide range of temperatures

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- ... uniform high quality and performance of each pump
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# Gen. Putt Challenges Avionics Industry

- To management he looks for adequate production and research facilities; to engineers for improved quality.
- Security of U. S. and effectiveness of our military operations depends on satisfactory electronic devices.

By Philip Klass

Maj. Gen. Donald L. Putt says avionics and electronic equipment manufacturers to speed the development of avionics and increase capacity, and that use in military capacity, wherever applicable, to improve reliability and to reduce size, weight, and cost.

"This is one of our challenges that Gen. Putt, vice commander of USAF's Air Research and Development Command, laid down to the management of the avionics and military electronics industries."

"What the Military Executive-Speaking before the professional group on engineering management at the recent annual convention of the Institute of Radio Engineers in New York on the subject of "What The Military Services Expect From Engineering Management in the Electronics Industry," Gen. Putt also challenged the industry to:

- Establish permanent facilities devoted to solving military electronics problems.
- Be willing to undertake research and development programs without requiring assurance of a subsequent long-run production program.

To engineering management, Putt stressed these challenges:

- Improve equipment reliability.
- Broadened capabilities.
- Design for easy maintenance.
- Develop new manufacturing techniques.
- Provide test equipment and handbooks on time.

"No Lack of Appreciation—"There is no lack of appreciation . . . for the tremendous job you have already performed," Putt said, emphasizing that specific criticisms did not apply to all of the industry. Nor did he deny that the military services were sometimes unfairly responsible for their own problems.

Gen. Putt noted that the industry recognizes that "the success of our military operations is almost wholly dependent upon the availability . . . of systems of electronic devices." He cited three examples:

- B-55 bombers. The loss of 11 crew

members and the success of a B-55 last year depend upon the successful operation of 2,100 vacuum tubes and thousands of associated avionics components and parts. These devices perform a multitude of vital tasks from the moment of takeoff until the final landing. They provide engine stabilization, are used to navigate, to detect and shoot down enemy fighters, to aim and guide the bombs to its target, and to bring the plane in for a landing in any kind of weather.

"Interception. The interceptors of the next future will have automatic avionics designs which take care over the plane's behavior. Ground order will automatically direct the plane to the vicinity of the target at which point the interceptor's own radar fire-control system will then take over to put it on a pursuit course."

When the target is within firing range, the avionics component will automatically aim and fire the weapons and then summarize the interceptor to avoid collision with the target. Avionics equipment will then automatically fire the interceptor to its base and bring it in for a landing. The pilot will take over only in the final moments of the landing.

"Challenge to Top Management—To meet the military electronics needs of the future, ARDC's vice commander relied on top management to build facilities devoted permanently to military electronics programs. He also called for "well laid plans for conversion of commercial capacity to defense work if and when required." Putt noted that "today military requirements are completely fulfilled on this day of the atomic bomb, conventional weapons . . . (which) disappear in an instant."

"The reluctance of some segments of industry to undertake military research and development work without the assurance . . . of a long production run to follow immediately is causing grave concern among the military," according to Putt.

He called management to recognize that "any research and development



### About Gen. Putt

Maj. Gen. Donald L. Putt, vice commander of the Air Research and Development Command, received military service as a second lieutenant in September 1938. In October he was assigned to the 37th Pursuit Squadron at Selfridge Field. He attended a number of courses and studies technical schools receiving a Master of Science degree in aeronautical engineering from California Institute of Technology in 1950.

He was district assistant chief of staff for intelligence at ANAC headquarters, Wright Patterson Field in October 1941, and became deputy chief of the Engineering Division there in December. He was appointed director of research and development in the Office of the Deputy Chief of Staff for Missouri at Air Force City in September 1945, and remained in director when the division was transferred to the Office of the Deputy Chief of Staff for Development in January 1955.

He became assistant deputy chief of staff for development and later acting deputy chief, in 1952. In January 1952 he was awarded commandant grade of the Wright Air Development Center of ARDC.

programs go far beyond the present frontiers of technical knowledge. This means that some progress will not be made, unless subsequent production is possible."

- Reliability Challenge—Putt called for

mark greater equipment reliability, pushing out that failure in critical military equipment several years ago had it that time severely jeopardized one of the Air Force's most important operations. (That was probably a reference to the difficulties experienced when the new K-type radar bombing system was first introduced on the B-50.) Most of these failures were due to unreliable vacuum tubes, Putt said. He called for "higher quality components whatever the cost."

"Since we know that we can never achieve 100% reliability, we just need a sustainability," Putt said. Sustainability, he added, reflects the cost of the overall military establishment, determining the quantities of material that have to be produced to sustain a given military force and effort.

"Attention to Packaging—Gen. Putt called on engineering management to give personal attention to the problem of improved equipment packaging to one cause of simplifying maintenance."

He urged the use of plug-in and/or three-way units over bakelite and wire unless otherwise possible to show whether the component is functioning properly. "A 'thickness' unit is a sub-assembly which normally is filled and sealed with a plastic mating fluid to prevent corrosion."

The speaker continued that engineering management must study the "complexity" of each equipment and component before deciding whether three-way component construction is feasible.

"This study must take into account the added problems of supply and warehousing and possible savings in man-power and overhead facilities. The study, Putt said, should include design areas with the military project engineers so that all factors may be considered."

Equipment must be designed to permit maintenance by personnel with a minimum of equipment and training, Putt said. He also urged that the equip-

ment be designed to require a minimum of maintenance in the forward zone so that the more complex work could be performed by experts in rear areas. Putt suggested that rear zone maintenance could be performed by the equipment manufacturer.

"Broadened Supplies—ARDC's vice commander admitted that "the military have gone overboard at times in complicating military specifications and at other times have been guilty of book-policing."

But the military wants "the simplest equipment . . . that will insure our weapons' superiority . . ." Putt said. "Our problem is to determine what

point the . . . effectiveness of a weapon per unit cost (and complexity) begins to decrease."

Putt urged engineering management to point out to the military all unnecessary complexity and to expand more effort in simplifying complex equipment.

Productivity has not been an serious problem in the electronics industry in the aircraft and aircraft engine industry, Putt said, but he felt that attention had been done in the research and development of new manufacturing methods, techniques, processes and materials.

This was partly the fault of the sub-

NEWS
NOTES

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ters, the general accepted end used that  
corrosive steps were being taken to  
improve the situation. The initial fix  
was often the producibility in order to  
ensure engagement on test and to hold  
equipment costs to an acceptable mini-  
mum.

► **Critical Problem—Fett** viewed the  
military's extreme difficulty in obtaining  
test equipment, technical data, and  
operating instructions on time and in  
the quantities needed, a "most critical  
problem." Conventional procedures and  
procurement practices were in effect,  
Fett said, "but we need the assistance  
of industry to develop and supply the  
operating information and test equip-  
ment as required."

Digitizing from his prepared paper,  
General Fett outlined an engineering  
management to provide the military  
with realistic schedules for research and  
development and for production pro-  
grams.

He pointed out that the delay of  
a single piece of aviation equipment can  
hold up an entire airplane produc-  
tion program.

Following the formal presentation, a  
question time was held. Gen.  
Fett how a manufacturer could afford to  
give advance schedules in proposals  
and questions when faced with less  
competitive competition. Fett admitted  
that he had no solution to the problem  
under all of industry submitted realistic  
solutions.

► **Major Misunderstanding—**Recognizing  
the considerable progress that he has  
made in maintaining aviation equip-  
ment, Fett called for more open partici-  
pation in relating size and weight for the  
supersonic aircraft and guided missiles  
of the future.

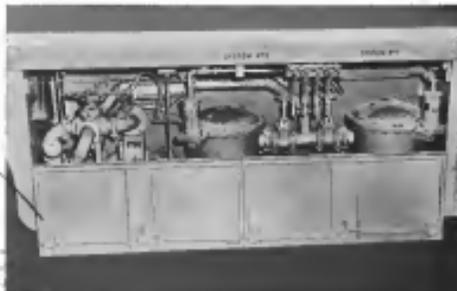
"The necessary hold transactions  
prevent the achieving improvement be-  
hind anything else appearing on the  
development horizon," Fett pointed  
out.

"Not only is there large profit in  
achieving minimum size, weight, cost,  
and power requirements, but likewise  
great gains in reliability and ruggedness  
of equipment appear possible." The  
general said that "engineering man-  
agement concentrate maximum efforts  
wherever applicable to the further  
development and achievement of transition  
in present, development of diversity  
and the application of innovations to  
existing electronic equipment."

► **Fuel Challenge—Gen. Fett** called on  
the industry to assure that the military  
is provided with superior and reliable  
electronic equipment, in proper quan-  
tities at the proper time, compatible with  
testing equipment, technical indexes  
and operating instructions.

"We want your men of engineering  
management to appreciate your respon-  
sibility for the success of our military  
equipment," Fett concluded.

**A multi-mounted Purolator  
Microseal filter used for aviation  
fuel.**



*Stop trouble before it starts with—*

# PurOlator Filters

## for bulk fuel handling



**A Purolator filter, galvanized type, for large capacity fuel installations. Standard models are available with flow rates of 100 to 1000 g.p.m., handling high petroleum products.**

**EXPERIENCE HAS PROVEN** that most troublesome  
fuel contamination occurs after the product  
has left the refinery storage tank.

Protect your customer—and insure continuing good  
will—by installing official Purolator® Microseal filters  
at tank outlets and on delivery trucks. Purolator units  
give excellent service in the high-flow filtration  
of gasoline, kerosene, fuel oil and diesel fuel.

Flammable Purolator Microseal® filter elements,  
remove particles as small as 5 microns in size,  
have up to 12 times the filtering area and dust  
storage capacity of ordinary filters.

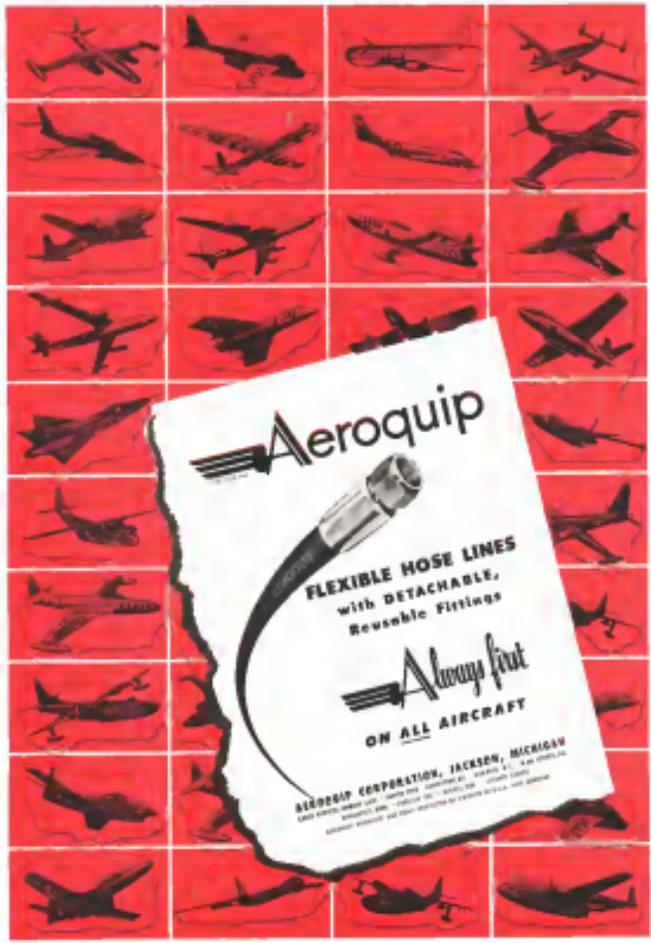
Send for your copy of the new Purolator Industrial  
Catalog No. 1003, describing filter units with flow capacities  
of 10 to 1500 gallons per minute.

Circle 10 on Reader Service



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Baltimore, New Haven and Toronto, Ontario, Canada  
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**FLEXIBLE HOSE LINES**  
with DETACHABLE,  
Reusable Fittings

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4440 JACKSON AVE. JACKSON, MICH. 49201

with built-in d.c. amplifier permits the measurement of closely shielded circuits. Unit weighs 14 lb.

**Oregon Electronic Mfg. Co., 2332 East Riverside, Portland 15, Ore.**

**Lab Testing Gets New Equipment**

Newly developed electronic instruments for laboratory testing or measurement include audio oscillator, work meters and phase meters. These units have been announced recently.

- **Audio oscillator.** Especially useful for checking FM/PM interference subcarrier equipment, the Model TD 100 oscillator has 20 fixed center-frequencies between 600 and 7,800 cps, with other frequency ranges between 200 and 100,000 cps available on special order. Individual frequencies are selected by peak-to-peak and can be varied 10% with a calibrated potentiometer. Frequency accuracy is reported at  $\pm 1\%$  and crest-to-crest distortion at full output at less than 1%. Dept. AW, Teledyne Laboratory, Inc., 74 Kinsel St., Westbury, N. Y.
- **Electronic wattmeter.** Model 110 can measure power of 0.5 to 300 watts, or up to 9,000 watts with auxiliary shunts, at frequencies of 10 to 3,000 cps. Accuracy is 2% at full scale and repeat me-

asure is 99,000 ohms to the potential circuit. \$5 to the nearest dollar, according to the manufacturer, Radio Electronics, 1866 Cottage Ave., Cleveland 15, Ohio.

• **Phase meter.** Model 404A provides direct indication of phase angle between two a.c. voltages of either symmetrical or unsymmetrical wave form at frequencies of 60 Hz up to 100 kc, or down to zero cps, with an external meter. Input voltage range is 0.5 to 100 and accuracy is  $\pm 1\%$  to 10 kc, increasing to 9% at 100 kc, with external indication, according to manufacturer, Advance Electronic Co., P.O. Box 394, Passaic, N. J.

6900  
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30000

- **Northwest Telen Colfax IFS.** Northwest Airlines has installed a Colfax Radio integrated flight system (IFS) directly on a Boeing Stearman. In evaluation, modification includes newly developed front-to-back course indicator.
- **New Fire-Extinguishing Technique.** General Electric has developed a new heat-treated plastic which offers increased protection against fire due to dust currents in avionics equipment. Designated GE 1154; Testable, the new material is

self-extinguishing in one minute or less, GE says. New materials reportedly have low moisture absorption and excellent electrical properties. It is available from GE's Chemical Dept. in thickness of 0.015 to 0.25 in.

• **ECA to Try Wilson CAT.** TransCanada Air Lines is planning to install one of the recently announced Wilson Electric computing automatic track-aid (CAT) on a DC-3 for evaluation. The Wilson CAT, a simplified flight director for ILS approaches, is now in operation on many Eastern Air Lines transports (Aviation Week Apr. 10, p. 55).

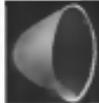
• **Study Polar Communications Risk.** The University of Alaska is piloting data and studying the communication blockouts frequently encountered in the polar region in the hope of being able to predict their occurrence, according to GM, Brent Ribben, noted previously.

• **Beckley to Distribute Digiflex.** Berkeley Scientific Division of Radcom International Co., Redwood, Calif., has been named distributor for "digiflex" manufactured by Coleman Engineering Co. of Los Angeles. Digiflex are used to convert computer or analog circuit voltage from analog into digital form.

**It's HEXCEL HONEYCOMB in the F86D!**

**Hexcel GLASS FABRIC Honeycomb**  
**PRE-SHAPED** to speed fabrication!

**TAPERED-CUT** to give optimum radar transmission!



Hexcel preformed "tapered-cut" sections and one complete are furnished in such quantities in production of North American Aviation's great F-86D fighter. Hexcel's Hexcel Preform are ready for installation being also modified by fabricator for "Wedge In" is illustrated.

**Hexcel ALUMINUM Honeycomb used in trailing edges, access doors and other parts on F86D!**

Hexcel's Hexcel ALU 1031 going substantially 100% used now.

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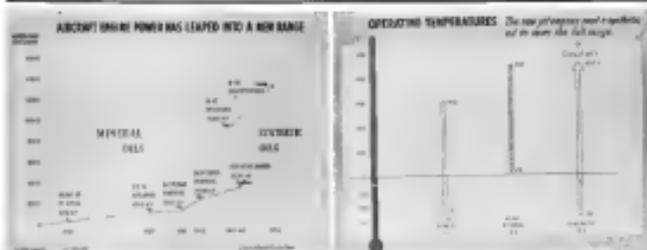
**STRUCTURAL HONEYCOMB in ALUMINUM GLASS FIBRIC - STAINLESS STEEL - COTTON FABRIC**



North American Aviation Company's F-86D fighter jet uses hexcel aluminum honeycomb fabricated from preformed tapered-cut honeycomb for radar transparency and being of the low "W" alloy honeycomb.

Photograph courtesy of North American Aviation Company

## EQUIPMENT



## New Oil Will Take Hotter Jets Higher

**Esso's synthetic resists altitudes and temperatures that make conventional mineral lubricants wilt.**

By George I. Chivilesca

A new synthetic jet engine lubricant, possessing a combination of properties not to be ascribed to a single mineral oil, was recently taken from under secrecy wraps (Aerospace Week, Apr. 13, p. 7).

Standard Oil's Esso Aviation Turbo Oil 51 has a temperature range wider than any single petroleum lubricant.

It can be flown to much higher altitudes before losing its high temperature, yet it remains fluid at Arctic temperatures.

Its lubricating capacity is four times that of light mineral oil.

The new oil resists accelerated decomposition and formation of carbonaceous deposits better than mineral oils. This is particularly important because of considerable heat soak-back, as jet engines after shut-down. Although operating at temperatures seldom exceed 415°, soak-back temperatures may climb to 571°F. Coke deposits can plug oil passages and filter, causing an accident.

First to be approved—EATO 15 is the first and (until now) the only synthetic lubricant to be approved under U. S. Military Specification MIL-L-1508 for synthetic jet engine lubricants, according to Standard Oil officials. They add that it is the only one now recommended by Wright Amendment's 301 Specifier for the complete range of power settings. The new lubricant comes from the Standard Oil Development Co., central research

and engineering affiliate of Standard Oil (N. J.).

A jet engine, Esso Aviation Turbo Oil 51, was developed in parallel in England by the Esso Development Co. Ltd. This oil has given satisfactory performance in all British turbojet and turbo-prop engines, say Standard spokesmen. Moreover, they state that the latest works of Rolls-Royce, Pratt and Whitney, Siddeley-Deputon and other turbojets cannot be operated under design conditions on any other lubricant.

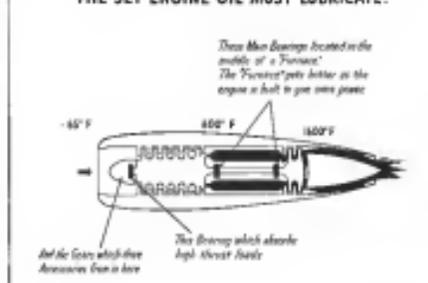
Unavoidable quantities of the com-

ponents used in the manufacture of EATO 51 are being exported for use in U. S. Esso developments, the British firm states.

But Though Tuzen—A recent demonstration of EATO 15 showed these qualities:

- **Hotter and higher.** Heated to 450°F, temperature to be expected at a jet engine's main bearings near the turbine, the new oil covered altitudes of 50,000 ft. before going any sign of boiling. The best light mineral oil began to boil at 40,000 ft., and bubbled furiously at 50,000 ft. Under actual flight conditions, boiling means excessive oil consumption and inadequate lubrication.
- **Colder and thicker.** Engine oil is

### THE JET ENGINE OIL MUST LUBRICATE:



## How L'O'F flightweight insulating blankets cut weight, save fuel, boost payload

L'O'F Super Fine Fiber Glass blankets provide excellent sound and thermal insulation for your aircraft.

These extremely lightweight blankets add very little to your flight load. And, because you do the same insulating job with less material, you gain space, increase payload weight and capacity.

The fine glass fibers will not burn, absorb moisture, expand, sag, or rot. Only inorganic fibers, of which Super Fine is composed, have all these qualities. Super Fine is a

superior insulator in its resistance to heat flow.

Super Fine is lightweight. One sq. ft. of 3/8" panel density and one-half inch thickness weighs only 4 oz. of one ounce. Properly applied, Super Fine will not shake down or peak under ordinary vibrations. And L'O'F Super Fine meets all applicable commercial and Government standards.

Get details from your nearest L'O'F office (shown in 50 reader circles). Or write Libbey-Owens-Ford Glass Company, Fiber-Glass Division, 3045 Wayne Building, Toledo 2, Ohio.



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- MECHANICAL DESIGNERS
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### Performance of Lubricants in Advanced Design Turbojet Engines\*

Lubricant	Mineral Oil		Ester-Type Synthetic Oil		
	Shell 100	A	B	C	D
Viscosity at 100° F.	7.5	7.5	5.5	5.5	5.5
Time of heating lubrication	Time required to heat	Excellent	Good	Excellent	Excellent
Oil consumption	High to moderate	Low	Low	Low	Low
Deposit and corrosion	High to heavy deposits, some corrosion	Light to medium deposits, no corrosion			
Low temperature pourability (min.)	-10 to -50°	-50°	-40 to -100°	-40 to -100°	-40 to -100°

\*AEC-107 Performance of Turbo Engine Synthetic Oils by Chrysler, General Motors, and Pratt & Whitney.

### Performance of Lubricants in Advanced Design Turboprop Engines\*

Lubricant	Mineral Oil		Ester-Type Synthetic Oil	
	Shell 100	SAE 100 Grade M MIL-155	A	B
Viscosity at 100° F.	7.5	7.5	5.5	5.5
Time of heating lubrication	Good	Good	Good	Time required to compare
Oil consumption	Low	Low	Low	Low
Deposit and corrosion	High to heavy deposits, some corrosion	Heavy deposits, some corrosion	Light to medium deposits, no corrosion	Light to medium deposits, no corrosion
Low temperature pourability (min.)	-10	-50	-40	-40

\*AEC-107 Performance of Turbo Engine Synthetic Oils by Chrysler, General Motors, and Pratt & Whitney.

### Properties of Aircraft Engine Oils\*

Property	Synthetic Oil			Mineral Oil	
	A	B	C	SAE Jet Engine Oil	Typical Turbo Engine Oil
Viscosity at 100° F.	7.5	5.5	5.5	5.5	5.5
Time and heat of 100 to 1200° F.	100	100	100	400	400
Flash point, °F.	400	400	400	350	350
Stability against loss of 100% of 1000 hrs.	3	3	3	10	10
Excellent corrosion stability at 200° F.	Stable, no corrosion	Stable, no corrosion	Stable, no corrosion	Corrosive, excessive	Corrosive, excessive
Temperature range for 1000 to 1000 hrs. at 100% °F.	-20 to -40	-20 to -50	-20 to -50	-40 to -50	-10 to 100

\*AEC-107 Performance of Turbo Engine Synthetic Oils by Chrysler, General Motors, and Pratt & Whitney.

accepted to be fluid enough at -50°F to be pumped up by pumps and forced through lubrication passages in the engine the instant the powerplant is started, for immediate protection of all

bearings. Standard synthetic steel is well too refrigerated to that temperature and no electrolytic stress exists for the metal oil. Heavy metal oil was completely

solidified at -65°F. Light mineral oil and EATO 15 was still fluid. When the mixer, which rotated at 900 rpm under no load, was connected in the light mineral oil, it slowed down to approximately 150 rpm. But when the mixer was switched to the synthetic oil, it was restored only to 200 rpm, showing that the synthetic lubricant was more fluid than light mineral oil at the low temperature.

• Stronger and tougher. Load-carrying characteristics as lubricity (the ability to maintain a film of lubricant between two pieces of metal under pressure) of EATO 15 and light mineral oil was compared on an Alcoa lubrication test. Weights were added to one of the bars at a rate of one every ten seconds. When getting that shaft was lubricated with light mineral oil, the addition of the third weight created enough friction to break the shaft. With synthetic lubricant, seven weights were added before the shaft broke, indicating that the new oil could carry a considerably larger load than the light mineral oil.

• Viscosity—This is how the synthetic lubricant stands up against conventional mineral aviation oil of 100 seconds viscosity at 100° F.

• EATO 15 has a viscosity of 15 centistokes.

• EATO 35 (the British formulation) has a viscosity of 35 centistokes.

• Conventional mineral oil has a viscosity of 100 centistokes. Although the synthetic lubricants are light enough to ensure fluid at low temperatures that completely control 100-second mineral oil, their viscosity exceeds that of mineral oil at high operating speeds and temperatures.

Importance of good lubricity is pointed up by the fact that jet engine accessory power takeoffs may develop some 150 hp. Oil even grants importance to the need for adequate mixing of the propeller driven an turbo-prop engine which transmit several thousand horsepower.

By incorporating synthetic lubrication, synthetic oil can have considerably better high-temperature oxidation-corrosion stability than jet engine mineral oil. Laboratory tests at 1479° F. have shown that synthetic oils are stable, non-corrosive, and 100% jet engine oil and 100% power engine oil are unstable, corrosive.

• Problem of Seal—One present drawback of synthetic oil lubricants is their effect on sealing rings. Synthetic rubber seals used with conventional mineral engine oil deteriorate badly when used with synthetic oils, especially at high temperatures.

New seals, capable of being used with the synthetic oils are being developed.

• Full Power Eaton-Standard Oil co-



## Northrop's Prime Equation

Northrop Aircraft production specifications include and install

two-ovag, cast wing nacelles. The "hot-shed" assembly technique, fibrously shrouded, precise fit installation of equipment in Scorpion F-49 interceptors now in production.

Equations are used to solve problems. At Northrop Aircraft, the prime equation combines teams of administrators, outstanding scientists, and production specialists with modern industrial and research facilities. The combination efficiently designs imagination and knowledge into actual installation of advanced design and inconvertible value.



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## we're eliminating chances of failure



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INDUSTRIAL SUPPLY, 718 1/2 1st St., St. Louis, Mo. 63101  
W. H. BENTLEY, 10000 S. W. 11th St., Miami, Fla. 33156  
K. J. & S. W. BENTLEY, 20200 E. 1st Ave., Denver, Colo. 80202  
W. H. BENTLEY, 10000 S. W. 11th St., Miami, Fla. 33156  
A. E. L. CO., 10000 S. W. 11th St., Miami, Fla. 33156

claim say that their new lubricant is really synthetic. It is synthesized from "cleared kerosene blocks"—even in this case.

The starting materials for producing kerosene can be obtained from petroleum, although the present product is not yet derived entirely from petroleum. Standard Oil says: The company hopes eventually to produce the kerosene entirely from petroleum. This will allow Standard Oil to increase production and decrease price of the product.

Current test is considerably above normal mile—possibly in the 90-110 mpg range. Although tests will drop with increased production, even today's high price may prove not too objectionable because of the very low oil oil consumption of a jet engine—about a quart an hour, according to Standard Oil spokesman.

The oil is being produced by several Standard Oil plants and cannot supply regular demand, company authorities say.

Manufacturers' Tests—Much work is still to be done in testing the new synthetic lubricant use done by jet engine manufacturers. The oil has operated in engines on the ground and in flight for more than 10,000 test hours. In the air, this would be equal to more than 6 million engine miles of flying.

Standard Oil Development Co. has been working on the synthetic oil since 1947. It first became commercially available in 1951, and is being used in such jet engines as the P77, J57 and T40 turbojet powerplants.

At the 1952 SBAC display in England, these aircraft engines were exhibited with KATO 15, Rolls Royce Avon in the Elvraut Hawk, de Havilland 134, Vickers Valiant, Supermarine Swift and English Electric Canberra (with afterburner), Avrocar, Siddeley Sycamore in the Canberra Jet and English Electric Canberra.

Standard Oil's engineers believe that this synthetic oil marks the beginning of a whole new concept in lubricant production and performance. As jet engines get bigger and hotter—and they are bound to—ever higher quality lubricants will be required.

"Much attention is to be placed in this field," Standard Oil adds, "and one thing is certain—the jet engine lubricants of the future will also be synthetic."

## Slip-Tube Joint Uses No Fitting

The possibility of joining aircraft tubing without the use of special fittings is being explored by Vickers, Inc.

In informal tests, Vickers has been

bolting the ends of two pieces of tubing and covering the joint with a sleeve of tubing whose inner diameter equals the outer diameter of the pieces being joined. Stainless steel sleeves are currently used to place aluminum sleeves are attached with a heat-cured adhesive. Vickers points out that elimination of fitting makes the joints extremely strong, and because no fitting is required, both weight and space are saved.

Cycling tests of the slip-joint assemblies at Vickers' Detroit lab have shown these results thus far:

- 2,000-1,000-psi, test rig.
- Stenders and part load, 91 million cycles without failure. Joint finally blew at 14,000 psi pressure.
- Aluminum part-lin gone through 1,250,000 cycles without failure.
- 65,000-psi, test rig.
- Stenders steel part-lin has been through 301,000 cycles without failure.
- Aluminum part-lin gone 114,000 cycles without failure.

The standard tubing used by Vickers comes from Superior Tube Co., Norristown, Pa. aluminum tubing comes from Aluminum Company of America, Pittsburgh, Pa.



## Ni-Ca Cells Hit at One Cause of Crashes

The military's interest in long-life nickel-cadmium storage batteries stems as much from the loss of three C-119s as from the loss of three C-119s. The latter was a result of lead-acid battery trouble, Marine Col. E. C. Hart, director of Bell's electronic division, has told Aviation Week.

The Pacific warbirds followed this sequence: voltage regulator malfunctions caused batteries to overvoltage; electrolytic boiled off; battery plates buckled and contacted each other; direct short that caused rapid complete failure of aircraft electrical system and the planes crashed.

This will be applicable with the



## SPRAY GUNS for every purpose and material

Today, thanks to recent developments in spray gun and material handling pumps you can use spray guns for just about every job.

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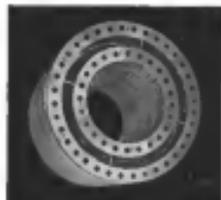
**Combustion section  
life increased  
over ten-fold**



The combustion section of jet engines was given an unprecedented lease on service life with the introduction of the "step wall" liner. The unique design of this combustion chamber liner has proved itself beyond question in the unexcelled combat record of the Westinghouse J34 engine. By eliminating severe hot spots and their heavy oxide damage, the liner answered one of the most critical of all service-life problems.

The actual design features of the "step wall" liner, a Westinghouse patent, stand out at a glance. In place of the usual cylindrical sheet metal construction, telescopic circular sections have been fitted together. This gives the liner a stepped contour, instead of a flat surface, allowing a continuous blanket of relatively cool air to pass over its surface. The result: protection from the ravages of temperatures over 3000°F.

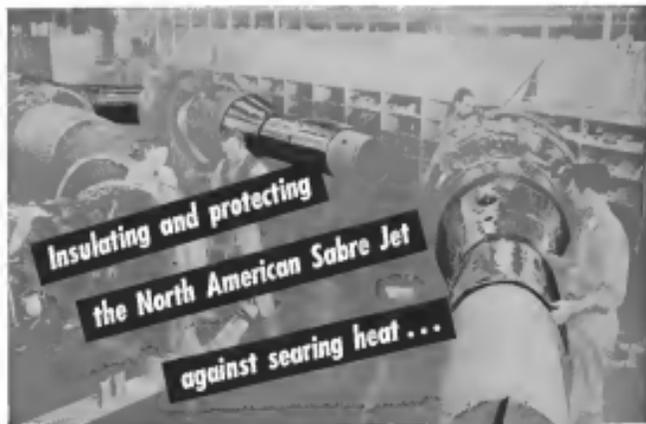
While the J34 was setting its unexcelled combat records at Korea, Westinghouse engineers were designing another new jet engine, using the "step wall" liner—the J40. Already severe altitude and wind-tunnel tests have been made. Again new records have been set . . . over 700 hours without a major component change. And again Westinghouse engineers have new designs on their drawing boards . . . new plans to keep advancing the jet engineering of today, with an eye to faster, more economical air transportation tomorrow. Westinghouse Electric Corporation, P. O. Box 288, Pittsburgh 30, Pennsylvania. 19611



"Step Wall" Liner—Full view of combustion chamber liner shows stepped contour design on both inside and outside surfaces.

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the North American Sabre Jet  
against searing heat ...**

## ... with Johns-Manville THERMOFLEX BLANKETS

**TIME PRODUCTION LINE SCENE** in the North American Aviation plant at Los Angeles shows ThermoFlex insulation Blankets being applied to tail pipes of North American Sabre Jets on order for the United States Air Force.

*New standard protection for many Air Force and Navy jet aircraft. Also flexible blankets insulate and protect the engine against scorching heat generated by jet power.*

ThermoFlex Blankets are custom-fabricated with highly stable Thermaflex RF felt. Developed by Johns-Manville Research and Insulation Engineers, this patented refractory fiber felt is sealed between sheets of corrosion-resistant metal foil. In manufacturing ThermoFlex Blankets to specification, careful attention is given to the economy of design for engine supports, actuator mountings, hot lines, thermocouple leads



*Hot North American Sabre Jet, covered with the ThermoFlex Blanket, before being applied to the tail pipes of the Sabre jet.*

and other controls. The precision-finished grooving and edges of the blanket... the close fit at corners... automatic maximum insulation value for the entire application. Furthermore, edges at corners are suitably sealed to prevent fuel penetration into the insulation.

In addition to insulating tail pipes, engine cones, turbine casings and turbochargers... ThermoFlex Blankets in special preformed shapes are used to insulate, protect, and support fluid storage tanks, air conditioning systems, divisional ducting, ducts and many other assemblies in all types of vessels.

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Circle 10 on Reader Service

**PRODUCTS for the  
AVIATION INDUSTRY**



**Johns-Manville**

nickel-cadmium batteries, because they are normally sealed as standard aircraft cases, Red says. The battery does not generate gas (sealed type produces hydrogen) and since the most a sealed, there is no need to check fluid level to watch about rupture of electrolyte during rough flight. The electrolyte in the Ni-Cd batteries is a non-corrosive alkaline fluid, whereas lead acid type used earlier acid.

Navy's order of 2,000 of the new batteries from the French firm, Societe Accumulateurs Dents et de Yverdon (Aviation Week May 16, p. 10) follows a test of 21 production units delivered about six months ago. An earlier lot of 10 developmental batteries was delivered for analysis 15 months ago.

Initial cost will be \$300 a battery, but it is expected that no later order the cost will be halved as tooling costs are absorbed.

For the present, Ni-Cd batteries will be made in the same dimensions as the old style units, so they can fit in present battery boxes. But it is believed that the same capacity can be obtained from smaller, lighter units in the future. The life of the nickel-cadmium type may equal that of the nickel they go in, Red says, although there is some doubt that capacity of the new type batteries is 90% greater than that of lead-acid batteries.

First official U. S. contact with the nickel-cadmium battery was during World War II, when it was encountered in the German Focke Wulf 190. Efforts of the Navy and Signal Corps to copy it cost more than one-half million dollars, but the project failed to follow.

The French firm, SAFT, probably has two-thirds of the world's know-how on nickel-cadmium. During the war, the leading units were being produced by SAFT, by a German plant in Hanover, and by the Juergen Co. in Sweden, which still produces them for the Swedish Air Force. SAFT bought the German plant after the war and moved it east of its engineers to France.

SAFT is now producing Ni-Cd batteries in its plants at Roubaixville and Bordeaux.

### High-Temp Anti-Icing Hose

A new high temperature anti-icing hose for jet engines is being produced by Aerospace Corp. The hose consists of an inner layer up to 45F to do the anti-ice job. It is made of a silicon, rubber like material, the most advanced type.

Here it is equipped with the Aero Corp's recently developed Little Gas and being to give improved sealing of fitting to hose.



## Aero Commander

equipped with

## KLIXON BREAKERS

for reliable Circuit Protection

The two-engine "Aero Commander," manufactured by Aero Design & Engineering Co., Oklahoma City, is a deluxe executive light-weight transport that is setting new performance standards. Among the many design features are high wing design, low-level cruise and unobstructed seating.

To prevent electrical circuit troubles, Aero Engineers specify and use Klixon switch type Circuit Breakers on every circuit requiring protection. They have found that these switch type circuit breakers save space, simplify pilot procedure on electrical circuit system operation and produce a system of extreme flexibility.

Lightweight, small and compact, Klixon Aircraft Breakers operate surely regardless of altitude, vibration, shock or motion... tripping out the circuit when internal troubles jeopardize the electrical system. Yet, harmless momentary transient shorts do not cause nuisance trips-out.

Periodic dependable circuit protection in your planes install Klixon Circuit Breakers. Write for bulletin giving data.



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Division of Westinghouse Electric Corporation  
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## NEW AVIATION PRODUCTS



### Ultrasonic Cleaner Shakes Off Dirt

Intricately shaped parts can be cleaned faster and easier with an improved ultrasonic degreaser developed by DeSoto Corp. The new sound is said to have greater flexibility than previous methods of this type.

Foreign matter that is difficult to remove by ordinary methods usually collects off jet engine blades and other parts given this treatment. In the case of jet blades, wax made parts used to detect flaws is removed practically instantaneously.

Key to the improved performance of DeSoto's Soundless process is a new man-made ceramic transducer element. The ceramic element can be mounted in areas and re-arranged as desired for maximum effect. They and the objects to be cleaned are immersed in a solvent such as trichloroethylene.

Ultrasonic cleaners have depended on the push on quartz transducers, but these have their sound waves at a single point, limiting their effectiveness. The new ceramic transducers send out 430-800-cps waves along their complete length. At present this is six inches. The process operates at 40 volts.

Instead of frequent cleaning, large batches now can be put in the ultrasonic and cleaned continuously, the company says.

First unit employing the Soundless process has been purchased by Reming-ton Rand, Inc. The machine is the largest ultrasonic degreaser ever built. DeSoto says.



HIGH-FREQUENCY SOUND waves in plastic wave guide push off jet engine turbine.

Soundless facilities can be added to regular degreaser to provide an additional cycle for "maximum refinement" in cleaning parts.

DeSoto Corp., Detroit 12, Mich.

### Nickel Sheet Lets Air Through, Bars Water

A porous nickel sheet for housing aircraft instruments and engine gauges prevents entrance of moisture but permits rapid equalization of air pressure to offset sudden altitude changes, says its maker, Moss Metallurgical Corp.

The sheet is aluminum-bronze by va-

por repellency and will not pass water if the differential is less than 5 psi. However, it passes air freely, according to the firm. The moisture and air said to be sufficient to prevent instruments from size to accidental saturation in water.

The material can be exposed on outer surfaces of aircraft trailing of titanium spacers with only occasional coating required against water erosion. Under test stringent conditions, the coating is permanent, the company says.

Moss Metallurgical Corp., 93 So. Oak Ave., Glassboro, N. J.

### New Copper Alloy

Development of a copper base alloy, intended for limited replacement of scarce beryllium-copper alloys and having possible use in aircraft instruments, was awarded at the Western Metal Congress held recently in Los Angeles.

Research and development of the product was carried out by Battelle Memorial Institute in behalf of International Business Machines Corp. The alloy is considered "a major step" toward electrical contact "reality" among other com. It contains about 10% nickel, 1.5% silicon and 4% aluminum.

One of the new alloy will be substantially less than that for copper-beryllium alloys, currently selling at \$71.50 per pound. Beryllium permits supply of the latter is critical because of possible large-scale use of beryllium in the atomic energy program.

Properties listed for the new alloy include good electrical conductivity, corrosion resistance and springiness. The alloy is hard and strong, yet soft enough for forming before finishing.

Battelle Memorial Institute, 505 King Ave., Columbus 12, Ohio.

### Simulates Desert

A new method and test cycling machine for accurate testing of military components under desert conditions is being produced in several sizes.

The tester is designed to permit precise control of environmental conditions and climatic constant record capabilities. It also is said to require less floor space than previous types. It was built specifically to meet requirements of MIL-R-5172A and MIL-R-5172A.

The unit is said to embody "novel" new concepts of streamlined airflow which reduce power needed to move air. Automatic controls enable it to simulate desired conditions for long runs. Humidity adaptation also is provided for pre-conditioning the equipment. Unit is furnished complete with test rigging and necessary accessories. Avianics Research Corp., Bristol, Conn.

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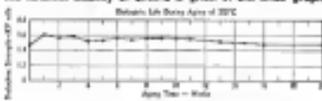


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\* At 273°C ± 0.5°C (521°F)

showing the effect of aging at 273°C (521°F) on the dielectric strength of Silastic.

Dielectric strength measured with 1/2 inch electrodes in air on two layers of Silastic E Tape, for example, average 0.75 KV per mil. After 20 weeks of continuous aging at 273°C with both surfaces exposed in an air circulating oven, dielectric strength gradually increased from a high of 0.401 to 0.439 KV per mil.

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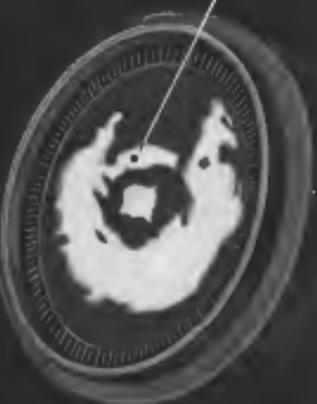
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Circle 14 on Reader Service Card

# MOUNTAIN... dead ahead!

New radar "sees" it through darkness



You are looking at the outline of a rock, but a rock's height. Through the darkness is now a new AN/SPW radar model in a separate room directly in the flight path. Now the pilot is looking to clear it.

Like a powerful telescope, this advanced radar equipment enables the pilot to study obstacles "in-flight" in a choice of five different ranges between 2 and 200 miles. Here is a complete background study that will readily return information and identify obstacles. It can locate ground-lands and other cloud formations—reads the pilot to



avoidance is safe means. If one may visualize, therefore, the pilot the actual characteristics of the ground he is flying over. It can help the pilot know his place on the desired flight path. It can even be used as a visual check against the landing and approach instruments in his plane.

The new Advanced Radar, made by RCA for the Navy Bureau of Aeronautics, is another technical achievement worked out in close cooperation with the military to insure it is necessary in situations. Meet the RCA engineers and field technicians in your branch of service.

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## Avionic Test Leads

Av-O-Tronics is marketing a test lead kit complete with a variety of snap-on accessories for universal testing of avionic equipment.

The kit permits simple interconnection between electrical components and includes both proper and probe-type leads. These may be fitted with probes, clips or other contacts, permitting connection with pen jacks, banana jacks, terminal posts and other hardware.

An exclusive feature of the set is a polyethylene glass probe which can accommodate various components in its hollow center. Alligator clips supplied are fitted with vinyl plastic sleeves. The set is designed to meet average laboratory needs.

Av-O-Tronics, Box 31, Lancaster, Calif.



## New Cold Chamber

All-weather test chamber that can drop the temperature to  $-150^{\circ}\text{F}$  and cure components through a wide range of altitude and humidity conditions are being custom built by Coastal Industrial Centers.

The equipment shown here is installed at Navy's Aircraft Instrument Laboratory in Philadelphia. Refrigerant compressor for the stainless steel chamber are the sealed type, arranged in a new cascade system made to improve performance and flexibility. Test coils

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SERVOMECHANISMS, Inc. Type 17ID-3 is a balanced 2 phase, 24-volt, 5500-RPM, 100-cycle damped induction motor employing a drag cup and an easily adjustable magnet to achieve velocity damping. This design provides for variable and constant torque velocity damping and lower operating temperatures. The forward degree of vector damping is enhanced by separating rotor core alignment.

The new damped induction control motor 17ID-3 of 5,000 RPM is also available.

### FEATURES OF DAMPED CONSTRUCTION DESIGN INCLUDE

- Output Rotoring
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- Lower Cost

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such as Highspeed Synchronous Design, Type 17H-3 to 25 volts and Type 17H-3 to 100 volts in speeds of 8,000, 12,000, and 24,000 RPM are available for various applications. Special winding and control shaft configurations can be provided on request.

**SERVOMECHANISMS**

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WESTHURST, L. L. N. Y.

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tests are needed more quickly. Requirements for the cooler are Form 13 and 22. Temperature can be set at any point from -150 to 200°F. Heat is supplied by stainless steel sheathed strip heaters.

Altitude conditions are provided in a chamber within the main chamber, which in effect simulates air flow over surface ambient changes. Capacity of the main chamber is for New York in 2 cu. ft., but can range up to 30 cu. ft. The refrigeration system is housed in the surround compartment; cooling coils, heaters, fan and suction pump are located immediately below the test chamber, accessible through a hinged access door.

Coswell Industrial Cooler, 22 W Fourth St., Heliand, Mich.

## Lab Measuring Units

A line of measuring instruments for ground and flight investigations has been announced by Scientific Research.

It includes inductive and floating strain wire type transducers, linear accelerometers, angular accelerometers, pressure and differential pressure transducers and strain gages.

Among advantages cited by the company for the instruments:

- Immediate response in only about tenths of an inch of amplitude.
- Complete acceleration can be measured with no response to centrifugal and air drag forces.

- Response superior introduced by components of explicit motion are eliminated.
- Inductive-type instrument gives most accurate readings and meets certain requirements not possible with strain wire type instruments.

The instruments generally have an accuracy of 1% of scale or better and operate through temperatures from -65 to 200°F. Resolution is 0.05% of full scale or better. Ranges are 25G to 1000G for linear accelerometers, 0.1 rad/sec<sup>2</sup> to 3000 rad/sec<sup>2</sup> for angular accelerometers; 0 to 250 in 150 and 0 to 5 psi and up to 100 psi pressure and differential pressure transducers; and 0.01 to 10 in. Hg vacuum gauges. Scientific Enterprises, 372 N. La Brea Ave., Hollywood 38, Calif.

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# SQUEEZE

## The 15,000-Ton

Alcoa's new 15,000-ton forging press recently went into operation at the Cleveland Forge Shop. An important addition to the country's largest aluminum forging facilities, this new press will form larger and more intricate structural shapes. It is the first step in Alcoa's "big press" program to give better service to America's aircraft industry.

### Aircraft and Parts Manufacturers—

should know Alcoa's "How to Do It" books and attend courses in stress heat set systems. Ask for one of the following books: *Forging Alcoa Aluminum*, *Designing for Alcoa Die Castings*, *Designing for Alcoa Forgings*, *Alcoa Aluminum and Its Alloys*. Special files are available to most fabrication processes.

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## ALSO ON THE MARKET

French milling machines built to American specifications are available in three models, including combination vertical and horizontal type. Rigidly constructed for heavy duty service, they are equipped with automatic cycle control and powered by 25-hp motor—Mancy Machinery Co., Inc., 403 Broadway St., New York 13.

Improved vitrified bond for grinding wheels for precision work is said to be available which to do more pieces per dressing and to cut cooler, true and faster, leaving no jagged edges, and cover a wider range of jobs—Norton Co., Worcester 6, Mass.

Template making is streamlined with adjustable profile template which can be made to fit almost any profile to close tolerances, one term of lead formation, each only \$97 stock—Toolcraft Mfg. Co., 6679 S. Duane Ave., Chicago 37, Ill.

Stud threading and setting is done faster and with less damage to stud bolts with new Kerline Stud Puller. Check tool adaptable to die, punch, lathes, portable machining machines and similar equipment does not score or cut, jams and virtually eliminates breakage, according to distributor—Laver, Inc., 770 S. Second St., Salt Lake City, Utah.

Two multiple tap modes increase speed and accuracy in all directions on parts in both cut, shagging damage, when frequency as well as accuracy is desired, tap moves forward with each stroke—Impact-O-Gaply Corp., 1050 Rockliff Ave., Cleveland 15, Ohio.

Major air cylinders with universal piston stroke can be used for cycling and reaction of work and cleaning parts in wash up and fixtures. They deliver 75-lb thrust when hooked to 90-psi source line—Air-Mite Co., 4117 W. Carroll St., Chicago, Ill.

Spay White cleaner has been developed as a faster, safer means of removing grease, wax, paint, dirt, carbon and other foreign matter from virtually any type surface without danger to personnel or damage to product—Kohn Products, Inc., 1218 N. Main St., Los Angeles 13, Calif.

Air gage (No. O-Kinet) Model G Case version) with recently developed simplifying seat permits 10,000 to 1 range location and has improved indicator—Parr & Whitson, Div. of Niles-Bentzen Prod. Co., Waco, Hartford 8, Conn.

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Current production is largely destined for our defense forces, but our research facilities, our skills and talents are available to various working solutions to non-military and general problems.



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- Efficient operation in ambient temperatures from minus 50°F to plus 200°F
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Moreover, Maxwell & Moore turbojet engine temperature control amplifiers satisfy all four requirements. They incorporate a highly successful design principle thoroughly proved during years of concentrated research, development and tests developed exclusively to automatic control systems for jet engines.

We believe our ability to apply our unique design technique to specific and unusual turbojet engine temperature control problems can be of real value to you. Our engineering counsel and extensive manufacturing and test facilities are at your service. We welcome your inquiry.



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## AIR TRANSPORT

### Fares Hearings Up to New CAB Member

- Denny has decisive vote on motion to dismiss.
- The outlook: a toned-down earnings "survey."

By Lee Moore

Outlook last week was that Civil Aeronautics Board would go ahead with its investigation of domestic airline fares and earnings.

The Board was split five-to-two on an earlier petition to dismiss the case until the new fifth member, Harmer Denny, prepared a comprehensive decision in favor of proceeding with a toned-down version of the investigation. He wants it to be one of a survey that the previously scheduled battle raged between the airlines and the CAB rate-making staff.

The case of rate is the General Fare Investigation. Faral hearings tentatively are slated to start next week. All the trunklines recently petitioned for dismissal of the case, immediately after taking office. Denny now expects to cast the deciding vote as the battle heats were down up as follows:

- Oswald Brown and Chan Gurney, backed by all the trunklines, opposed continuance of the investigation.
- Joseph Abess and Josh Lee, backed by the entire rate-making staff, wanted to continue it.
- New member Denny indicated he would back the rate by voting for an injunction. He did so was suggested that the Board never had authorized the small rate setup. But he was also surprised that it was scheduled to take the form of an "injunction" leading to a definite Board decision—fare set down or continue the case. Denny said he wants the investigation to be kept alive.

Charles Ryan and the other members made last week were being making a compromise version of the case, more on the order of a last-minute investigation and not necessarily requiring an immediate Board conclusion.

The domestic airlines which have recently petitioned CAB to dismiss the investigation, already started the public discussion a year ago. This had stirred much public interest but now they first had Board investigation of this nature may lead to better fare.

• The Board—Main axis of the investi-

### Domestic Trunkline Earnings Ratios

(Excludes trunkline with foreign airfares ratios)

	Net income as investment*		Operating profit margin**	
	1952	1951	1952	1951
American (1)	15	14	14	28
Eastern (2)	12	15	13	21
United (3)	12	15	16	21
Continental (4)	12	15	16	21
Delta (5)	29	21	14	28
National (6)	28	29	17	28
Western (7)	13	21	16	25
Competition (8)	38	15	9	15
National (9)	100	(1-7)	0-8	5
Average***	19.0	18.0	18.0	24.0
Weighted Average***	19.0	16.0	13	27

\* Production cost return after taxes on net operating income.

\*\* Operating profit margin on operating income and expense and before income taxes.

\*\*\* Average is mean of individual airline ratios, divided by number of lines. This figure is related only for the lines listed.

\*\*\*\* Highest average of all ratios on investment in the case shown most profitable divided by their total number. For profit margin, it is their total net operating income divided by their total revenue. American, Eastern and United completely dominate this ratio category.

\*\*\*\*\* Book and advertising in international routes considered as income.

Source: From 41 reports of income to CAB, rates compiled by American News and CAB Rate Division.

gation are to find out how high fares would be set to build a fair return to airlines or lowest cost to the public.

Fare set main issue that governs airlines.

How high should CAB permit non-subsidized airlines' return on investment to be before cutting fares?

CAB CAB policy was to permit enough return to the airlines to maintain service. Since the subsidy and rate was generally granted to interstate airlines, airlines often forced lower fare CAB, with absolute control over the airlines' fares, high low consequences about the government with fare set now, when local domestic airlines are completely free from money or subsidy.

New fifth airline member by newly selected airline for more than two years has raised a totally new rate-making position. Returns now depend on the line level.

• Setting fares "in the public interest" is a new slogan competitive industry, airlines can argue point to equity supply of demand. But the same-old-publicity, CAB regulated airlines can argue that. So placing the product in the CAB member—airline, government

operated rate lines regardless of local conditions—resolves the link of price increasing without experimenting.

• Five top is a secondary issue in this investigation. Some airlines and Board officials propose that fare set lower than in accordance with costs. Flying a passenger 200 mi. now cost 4 cents a mile, while flying him 2,000 mi. now cost only 3 cents a mile. Yet the in-flight fare cost virtually 4 cents a mile today. However, airline transport commission probably using standard fare substantially, and kindred approach lines are down to 4 cents a mile. So many observers calculate that the great part of fare cost can be far from correct.

• Time lag in the fare set as the new rate-making investigation Bureau forecasts of the airlines changed twice since the investigation started a year ago. The Board proved more ready correct in forecasting. It predicted moderate rate but properly through the first half of last year and a boom the second half.

However, it may be another six months to a year before CAB can conclude the investigation. Short-term outlook this spring is far continued stability at 1951-52 level. But a decision based on recent data might prove wrong if the outlook changes late this year. That

in the Board's decisions. Airlines are handicapped. CAB agrees that it has a public responsibility to regulate fares at a protected rate.

## Allegheny Wins 3-Year Certificate Renewal

Allegheny Airlines route certificate was renewed last week through the end of 1956 by Civil Aeronautics Board. The Board also approved:

- Route extension of Allegheny (formerly All-American Airways) to new cities between Cleveland-New York and Cleveland-Pittsburgh.

- Midwest Airlines authorization to fly from El Paso-Coaling, N. Y., via its route No. 94 to Bedford, Pa.

- Colonial Airlines extension from Allentown, Pa., to Philadelphia with Airline temporary authorization to serve Lancaster, Pa., on this route.

- Trans World Airlines' suspension from Lancaster, Pa., and Wilmington, Del.

- American Airlines' suspension from Washington, W. Va., and when Allegheny starts serving it, East, Pa.

CAB member John Lee agreed on renewal of Allegheny's certificate but noted that CAB must give the carrier's application for a new route from Washington to Coalinga via El Paso, Coalinga and Parkburg and let American also serve to that intermediate point.

CAB has estimated Allegheny's subsidy at about \$3.5 million annually.

## Southern Airways Wins Route Renewal

Southern Airways was renewed its local service route certificate by Civil Aeronautics Board last Dec. 13, 1955.

Under the new certificate, effective June 15, Southern will serve 10 cities in Louisiana, Mississippi, Tennessee, Alabama, Georgia, South Carolina, North Carolina and Florida. CAB recently estimated Southern's annual subsidy requirement for this service at about \$1.5 million.

Route changes which were approved by the Board:

- Route extension to serve Monroe, La., and Calport/Bolton, Miss.

- Route extension to drop the segment from Columbus, Ga., to Charleston, S. C., and stop at Elizabethburg, Miss., and New Hill, S. C.

- Transline long services that Southern discontinued are transferred to CAB but not approved the proposed new permits by Eastern at Spartanburg, S. C.; Albany, Ga.; Durham, Ala.; by National at Vidalia, Ga.; by Chicago & Southern to Greenwood, Miss.



HARRY D DENNY, (R. right) was the second vote in the CAB election by a CAB member by Charles Oswald Ryan. Denny is on the New South National Executive Board.

## Denny Holds Balance in CAB

Balance of power on the five-man Civil Aeronautics Board has fallen to the new Republican member, Harry Denny, Jr.

Chairman of CAB's Grand Jury Investigation—opposed by all non-Republican wings upon his denials.

Other significant cases on which he vote may be decisive this year include:

- Colonial merger with Eastern as National
- Black Flying Tiger merger.
- Trans-Alberta route case.
- Decision on new route extension applications to be considered in the transcontinental Denver and Oklahoma routes case.

Denny's true opinion Dec. 31, but Washington observers predict he will be re-appointed to a full term next year.

**Airline Policy**—In his short experience for Senate confirmation, Denny told the secretary, "I don't want to actually myself to the middle long airlines, but the direct or non-direct." He added that he "would be very much advanced of myself if I were classified as an advocate of one or the other."

Asked how he felt about subsidy for local service airlines he said, "I don't think they could exist for public convenience unless they were subsidized, some of them."

Denny had Airways Wings he is not yet prepared to make any further side seats on CAB policy, but he has only stated the job.

**Pick** Anshutz—Denny last week elected as his executive assistant K. Vernon Anshutz, a CAB member since 1945. Recliffe is both a graduate

engineer and lawyer (B.S. New York University, LL.B. Georgetown University).

Five to becoming a CAB member, he was a top engineer for National Advisory Commission for Aeronautics at the Langley Field aeronautical laboratories and later acted as the executive officer at NASA's Washington head quarters.

- **Activities** Experience—Denny's activities include:

- **Pilot**—Has led to enter directly as a flyer in World War I, Denny volunteered as a private and won a commission in ground training. He became pilot in charge of ground training at Greater Field, Lake Charles, La., and thereby managed to log about 100 hr pilot time by his own self-constructed experience for these days and places.

- **Research** witness, Denny represented the secretary's committee of the Pittsburgh Chamber of Commerce on several city route cases. The most notable, he says, was the highly controversial Trans World Airlines application to serve San Francisco. He testified in favor of it, because Pittsburgh actually wanted direct service. Denny also was on the support advisory committee of Allegheny County for about 11 years and long has been a member of the Arts Club of Pittsburgh.

- **Pink** tracing, Inspector Denny World War II, Denny was assistant inspector for the Eastern Flight Training Command. As part of an Air Force train instructor training team, he says he probably testified to a many pilots in any man in the war. His job was check-

ing up on living conditions and pilot records.

- **Commerce** commissioner, Denny was by law a lot about CAB and the airlines when he served on the House Interstate and Foreign Commerce Committee (1945-52).

- **Politics**—The new CAB member's ties with politics was his apparent interest as Director of Public Safety by Pittsburgh's late Republican mayor in 1931. He served about 11 months, a term cut short by the election of a Democratic mayor.

In 1941, Denny ran for mayor against Charles Scully and lost by 1,200 out of 275,000 votes out. He tried unsuccessfully four years later for the Republican nomination for mayor in 1950, but he was elected to Congress from Pennsylvania's 29th District in Pittsburgh, representing another Republican.

But he was then re-elected into a Democratic stronghold out but in last year's election.

On the National Executive Board of the Boy Scouts of America, Denny had contact with President Eisenhower, who also served as the board's highest president of Columbia University. Denny and Mr. Eisenhower imposed him jointly in an all-around, warm and cooperative person. He was an "Ezra" man from then on, Denny says.

- **Pittsburgh** Prominence—The Denny family has been prominent in Pittsburgh since before 1798, when Ebenezer Denny was Allegheny County commissioner and later Allegheny's first mayor. His great-grandfather, Hanna Denny was a member of Congress during the year 1829-35.

Denny at 67 is described tall, of frame, well-mannered, congenitally decent, bald, white-starched, and is called "The Colonel" (Mr. Percé Le Col, Ret.) He is an able and courteous to other people (31).

He attended St. Paul's Preparatory School and Yale University received his law degree at University of Pittsburgh in 1911, became attorney at law, soon went commission and chairman of the advisory committee on Denny's report.

Although his grandfather and father were wealthy, Denny cut out the family inheritance and now divides into 25 parts and has received heavy tax cuts.

- **Boy Scouts**—Denny is president of his "79 years in Scouting" and 15 years on the national executive board.

His other activities have included American Legion, Carnegie Hero Fund Commission, Board of Western Pennsylvania Safety Council, Society of the Classically Sane of the American Revolution, and board of trustees of the First Presbyterian Church of Pittsburgh.

Denny is married to Mrs. MRS. MRS. two daughters and six grandchildren.

## Lack of Helicopters

### Stymies N. Y. Airways

Lack of suitable rotary helicopters at the heart of New York City is holding up New York Airways plans to expand its service during this year, believe Civil Aeronautics Board. The carrier has 100,000 shares of stock in the first annual report issued by the certificated carrier.

He noted that although Los Angeles and Chicago are making stocks of pay off in their earlier years, no such facilities are available in New York.

Installation of helicopter passenger service this year as a limited base between La Guardia, Newark and N. Y. International (Midway) airports is anticipated by New York Airways officials, Commerce said.

The carrier showed operating revenues totaling \$16,917 compared with expense of \$12,361 for the carrier's closest month operating year ending Dec. 31st. The \$4,556 operating loss was accounted to a \$14,677 net by loss operations, according presently before the Board.

- **New Capex**—Much of the deficit is expected to be made up when Civil Aeronautics Board provides preliminary permits in adjusting NYA's temporary mail rate which is present at 92.16 per ton mile for the last 15,000 lbs.

The carrier expects to put into operation this year additional Sikorsky S-55 helicopters so that by the end of 1953 its services will extend from Peekskill,

N. Y., on the north to Trenton and Albany, N. J., on the south—and from Dover, N. J., on the west to an airport at Washington, D. C., and Washington, D. C. West flights will utilize four DC-3 to serve S-55.

At the end of March, 1951 New York Airways S-55 had set 1,345 hr. shift and 10,000 hrs. of flight time. It has since then they carried 1,028,371 lb. of mail and flown 13,170 hr. of cargo. The letter operation was started in January.

## India's Airlines Face Government Opposition

India's parliament at New Delhi is expected to pass a proposition bill this month authorizing the state in due course into two government-owned corporations.

The bill would change the carrier into:

- **Indian Airlines**, domestic operator serving all intra-India routes and nearby foreign points in Pakistan, Ceylon, Iran, Malabar and Burma.
- **Asian Indian International**, serving long foreign routes.

Since Mar. 1, 1949, the Indian government has paid about \$2.5 million in subsidies to keep the airlines in operation.

Under the provisions of the other aviation bill, the government would buy 12 new aircraft to operate on trunk routes within India and to supplement the present scheduled service of Constellation, Dakota and Viscount as it would be operated in feeder routes.

Transfer of aircraft and equipment from private to government ownership would be accomplished by Dec. 31st. Cost to the government is estimated at \$30 million, of which 10% is to be paid in cash to private line owners.

New agreements would be set up with the government to aid in administering the nationalized program. As an transport council said a labor relations committee.

I. B. D. Tils, chairman of Air India International, Ltd., is expected to be named chairman of the new aviation board under K. C. Mahalan, former head of the Indian Purchasing Mission in Washington, has been mentioned as possible chairman of the domestic carrier.

## CAB Calendar

**Executive hearings, continue:**

- Large transport carrier pricing before Board (10:30 a.m. follow next week).
- Mail, time and class extension before Board (10:30 a.m. follow next week).
- Trans-Alberta route (10:30 a.m. follow next week).
- Small airplane route (10:30 a.m. follow next week).
- Postal Airplane mail route (10:30 a.m. follow next week).
- General transport (10:30 a.m. follow next week).

**Public hearings, transportation:**

- Trans-Alberta route (10:30 a.m. follow next week).
- Small airplane route (10:30 a.m. follow next week).
- Postal Airplane mail route (10:30 a.m. follow next week).
- General transport (10:30 a.m. follow next week).

**Public hearings, other:**

- Trans-Alberta route (10:30 a.m. follow next week).
- Small airplane route (10:30 a.m. follow next week).
- Postal Airplane mail route (10:30 a.m. follow next week).
- General transport (10:30 a.m. follow next week).

**Other transportation before Board, continue:**

- PROPOSED DENNY BOARD MEMBERS: HARRY D. DENNY, JR., Chairman; CHARLES O. RYAN, Vice Chairman; JOHN L. LEAHY, Member; JOHN W. WATSON, Member; JOHN W. WATSON, Member.
- General aviation (10:30 a.m. follow next week).
- Public hearings (10:30 a.m. follow next week).
- Small airplane route (10:30 a.m. follow next week).
- Postal Airplane mail route (10:30 a.m. follow next week).
- General transport (10:30 a.m. follow next week).





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Experiment in Publicity

Aviation executives had no time acting on an editorial suggestion last Apr. 6 that they report interesting and important activities of their companies to *Aerospace Week* for possible publication as a business intelligence service to readers.

Our staff—the largest working on any single aviation publication—a digged constantly for important technical and commercial news, which we gather, filter and print each week but we have decided to enter the cooperation of our readers in covering important aviation news from hundreds of firms which otherwise would not come to the attention of any publications.

That we launch an experiment in business and technical journalism. For several weeks we shall print the best letters we receive, either in full or abridged. Other letters that are not printed may result in our development of stories, based on further discussion with correspondents.

As we pointed out, most correspondents—even those with public relations departments—fail to take full advantage of the services offered by a carefully staffed business and technical magazine.

There are probably many firms whose services or products are very unusual or outstanding in their differences, or which perform unique or exceedingly valuable jobs. Remember, such news is most vivid and which is unique, little known, quite different, or reports opportunities for great economy, time saving, new technical or business possibilities.

Furthermore, your information must be important to busy business men or technical people—not just a handful. And, necessarily, the judgment of the editors in deciding what is printed must be final.

For example, published below is a cross-section of the most interesting letters, abridged, received in the first week after publication of the editorial on Apr. 6. There must be many more companies with interesting news which has never been published elsewhere.

THE LATEST ON A FLYING CAR

Gentlemen:

Thank you for an "How to Follow-up Your Company" . . . pamphlet as to how we can still working on the "Flying Car." We completed state test phase of our CAA, AEC but this work, which means we can go ahead on the last two Airzone we are building.

We have completed the production prototype sufficiently to permit the various phases of the state test program, and now move to the parts for the other cars have been put together as assemblies. We expect the first production car to be completed in about 30 days and will then submit it to CAA for flight evaluation with the further hope that we can obtain STC by summer . . .

The new Airzone embody . . . new features, such as automatic landing of the flight controls when the wings are not installed to prevent a landing with controls locked; automatic fuel/air flow system to eliminate the fuel pump and its own gravity feed shoulder harness, poppet wastegate; and a better than 1000 rpm engine.

The control problem still shows our progress. Incidentally, we need part of the credit for getting our state test program completed goes to CAA. They have been more than cooperative with their financial and technical advice, which we could not find available had not looking the wings and other components. Being Aircraft

based on short legs and other materials, as though we were big airplanes. We say cooperation isn't possible in the industry?

Moit Tabor  
Aerospace, Inc.  
Longview, Wash.

THIS COMPANY FURRIES YOUR PLANES ANYWHERE

To the Editor:

We are the largest organization of our type, presently designed for aircraft delivery throughout the world. We have done the same work for a considerable number of overseas and national manufacturers on the firm delivery of their aircraft . . .

We have for the past two years been delivering the de Havilland Doves to Canada and the U.S. We are approaching to do the same before the 180th Dove to be flown across the North Atlantic to this continent. Last week we delivered the first Hawker (Hawker-Dove). This was the first of its type to hit this country. . . The first Hawk was the prototype model and had the fuel tank. We are pleased by its Havilland that before too long they will have production on the retractable gear version, which will be exported to this country. . .

We also delivered the first Aero Commander exported from this country—through the North Atlantic, Europe, New Zealand, Fiji, India to Tokyo. The second Commander is en route to Tokyo. In both the Hawk and Commander, Jack Paul, our president, delivered the first of their type and set up the operational program for them to follow.

We at Florida have enjoyed your factual articles immensely. . . . We pay great attention to your Sunlightlet section.

Frank D. Duggin, Jr., Director of Operations  
Florida; Jacksonville  
Lockhead Air Terminal, Turlock, Cal.

MAKING SOMETHING OUT OF NOTHING

Gentlemen:

I can not ordinarily give to writing letters to the editor in the case of your magazine, the more news is a regular news feature making to companies or designers who. As a regular news feature, I find your magazine makes me somewhat with news in all branches of aviation, on new developments, and what's doing what.

We think possibly our service to the aircraft industry is unique, touching all phases of aircraft construction, including other manufacturers.

In 1941, at the request of the Douglas Aircraft Co. Inc., we developed a series of machines which could separate metal parts accurately, reasonably, and quickly. I wish to mention them, such as: bolts, nuts and other similar—everything from two sizes of nuts used by accident in pistons and such nuts to the one size nutting in which we have found as many as 15,000 separate items in process.

Since 1941 we have scaled and returned to the aircraft industry 1,000,000 pounds of small hardware which otherwise would have been used as scrap. We know of only one other such response to industrial operations—Industrial Mills Inc., Canton, Cal. where president, Mr. Roy C. Buck, was a partner with us during the development of this machinery.

Our company has done work on everything from 18 pounds of metal nuts for a Dornier dealer to 25,000 pounds as one lot out of the country's largest Air Force plane contractors. We are now under contract with McDonnell Aircraft Corp. and have completed in three months over 50,000 pounds of metal industrial hardware. A. B. Mathison, President  
Mathison Metals, Inc.  
Oklahoma City 24, Okla.

. . . .

So you don't need a publicity man to tell us that you are doing work of unusual interest. If you are an executive, write a letter on your firm letterhead to the Editor of *AVIATION WEEK*, 180 West 42nd St., New York, 36, N. Y.

—Robert H. Wood

# Bendix Torque-Link Steering

A new and better steerable nose gear design . . . Easier and more efficient steering action . . . Important savings in weight, space and maintenance.



Bendix Torque-Link Steering is a rugged self-contained unit which can be built in as an integral part of any nose gear. This simple compact steering unit actually does the work of two conventional mechanisms. The hydraulic power cylinders take the place of the upper steering members of conventional systems. They serve the double purpose of torque links and steering members. This, with the new performing dual function, Bendix Torque-Link Steering offers important savings in weight, space and maintenance.

In addition, steering dampening is more effective because dampening fluid can be applied as a point where there is the least amount of spring action in the system.

Although Bendix Torque-Link Steering is a new concept of nose gear steering, it has been in the hands of test pilots and ground crews for several months. It is now being used in several of the newer planes with excellent results. Bendix engineers welcome the opportunity to meet all ground designers in the application of the Torque-Link Steering to their new airplanes.

**BENDIX DIVISION SOUTH BEND**

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